

GLOBAL SYSTEMS INTEGRATION MARKET

1990 - 1995

INPUT

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1990-1995

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Federal Information Systems and Services Program (FISSP)

Federal Systems Integration Market, 1990-1995

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Abstract

INPUT estimates that the federal government market for systems integration contract opportunities will increase from \$2.8 billion in 1990 to \$5.6 billion by 1995, at a compound annual growth rate of 14%.

This update of the 1989 systems integration report presents the results of research and analyses of various operational aspects and strategies of the integration market. The many changes in this update include the following:

- An updated forecast of the systems integration market, including current and out-year funding
- An update of the interviews with agency users of integrated systems
- A revised list of open opportunities
- New vendor interviews for their perceptions of the systems integration market
- An update of the competitive trends and market share of major systems integration vendors
- Case studies of systems integration contracts
- An examination of the current issues affecting federal government systems integration vendors
- The exclusion of turnkey systems from the scope of this report

This report contains 171 pages, including 39 exhibits.

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Table of Contents

I	Introduction	I-1
	A. Scope	I-2
	B. Methodology	I-2
	C. Report Organization	I-2
II	Executive Overview	II-1
	A. Federal Market Issues	II-1
	B. Market Forecast	II-2
	C. Primary Applications	II-3
	D. Competitive Forces	II-4
	E. Agency Requirements	II-5
	F. Recommendations	II-6
III	Market Analysis and Forecast	III-1
	A. Overview	III-1
	B. Market Forecast	III-2
	1. Delivery Mode Forecast	III-4
	2. Agency Forecast	III-5
	3. Applications Forecast	III-9
	C. Competition	III-10
	1. Top Ten Systems Integrators	III-11
	2. Professional Service Vendors	III-12
	3. Equipment Vendors	III-13
	4. Foreign Competition	III-13
	D. Federal Market Issues	III-13
	1. Federal Policies and Regulations	III-14
	2. Budgetary Constraints	III-16
	3. Software Integration and Productivity Improvements	III-16
	4. Artificial Intelligence	III-17
	5. Uncertainties and Issues	III-18

Table of Contents (Continued)

IV	Agency Requirements	IV-1
	A. Overview	IV-1
	B. Hardware Systems	IV-3
	C. System Applications	IV-4
	D. Case Studies of Systems Integration Contracts	IV-6
	E. Acquisition Plans and Preferences	IV-20
	1. Participants	IV-24
	2. Bidder Conferences	IV-24
	3. User Criteria	IV-25
	4. References	IV-25
	F. Trends	IV-26
V	Systems Integration Vendors	V-1
	A. Overview	V-1
	B. Market Share	V-2
	1. Top Systems Integrators	V-2
	2. Corporate Profiles of Top Federal Systems Integrators	V-3
	a. IBM Corporation	V-3
	b. Electronic Data Systems (EDS)	V-4
	c. Science Applications International Corporation (SAIC)	V-5
	d. Martin Marietta	V-6
	e. Computer Sciences Corporation (CSC)	V-7
	f. Unisys	V-8
	g. Boeing Computer Services (BCS)	V-9
	h. Grumman Data Systems (GDS)	V-10
	i. Planning Research Corporation (PRC/ Black and Decker)	V-10
	j. Control Data Corporation (CDC)	V-11
	k. American Management Systems (AMS), Incorporated	V-12
	l. Andersen Consulting	V-13
	m. Digital Equipment Corporation (DEC)	V-14
	n. The Mitre Corporation	V-14
	o. Oracle Complex Systems	V-15
	p. SHL Systemhouse	V-15
	q. Syscon	V-16
	r. TRW	V-16
	C. Characteristics of Vendor Respondents	V-18
	1. The Systems Integration Market	V-18
	2. Procurement Approaches	V-21

Table of Contents (Continued)

V	3. Agency Opportunities	V-23
	D. Vendor Perceptions of Federal Systems Integration	V-25
	E. Commercial versus Federal Systems Integration	V-26
	1. Market Differences	V-26
	2. Commercial and Federal Market Directions	V-29
	F. Strategies for Success	V-30
	1. Growing Demands and Staff Shortages	V-30
	2. Pervasiveness of Information Systems	V-32
	3. Demands for Productivity	V-32
	4. Vendors' Recommendations for Success	V-35

VI	Key Opportunities	VI-1
	A. Present and Future Programs	VI-1
	B. Recent Awards	VI-3
	C. Systems Integration Opportunities by Agency	VI-4

VII	Appendixes	
	A. Interview Profiles	A-1
	A. Federal Agency Respondents Profile	A-1
	1. Contact Summary	A-1
	2. List of Agencies	A-1
	B. Vendor Respondents Profile	A-2
	C. Case Study Respondent Profile	A-2
	B. Definitions	B-1
	A. Delivery Modes	B-1
	B. Hardware/Hardware Systems	B-9
	C. Telecommunications	B-11
	D. General Definitions	B-13
	E. Other Considerations	B-21
	C. Glossary of Acronyms	C-1
	A. Federal Acronyms	C-1
	B. General and Industry Acronyms	C-11
	D. Policies, Regulations, and Standards	D-1
	A. OMB Circulars	D-1

Table of Contents (Continued)

VII		
	B. GSA Publications	D-1
	C. DoD Directives	D-1
	D. Standards	D-2
	E. Related INPUT Reports	E-1
	A. Annual Market Analyses	E-1
	B. Industry Surveys	E-1
	C. Market Reports	E-1
	F. Questionnaires	F-1
	A. Definitions	F-1
	B. Questionnaires	F-3
	1. Federal Systems Integration Market	F-3
	2. Federal Systems Integration Case Study—Prime Contractor	F-8
	3. Federal Systems Integration Case Study—Agency	F-13

VIII	About INPUT	VIII-1
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Exhibits

II

-1	Federal Market Issues	II-1
-2	Systems Integration Market—GFY 1990-GFY 1995	II-2
-3	Federal Systems Integration Market by Type of Application	II-3
-4	Top 5 SI Vendors in the Federal ADP Market, CY 1989	II-4
-5	Distribution of Type of Target Hardware Systems for Systems Integration Programs	II-5
-6	Critical Success Factors in SI Projects	II-6

III

-1	Systems Integration Market, GFY 1990-GFY 1995	III-3
-2	Civilian Agency Systems Integration Market—GFY 1990- GFY 1995	III-6
-3	Defense Systems Integration Market—GFY 1990- GFY 1995	III-7
-4	Custom SI Initiatives by Agency—GFY 1990-GFY 1995	III-8
-5	Federal Systems Integration Market by Type of Application	III-10
-6	Top 10 SI Vendors in the Federal ADP Market— CY 1989	III-12
-7	Federal Information Processing Weaknesses	III-13
-8	Ten Issue Areas That Have the Most Effect on Grand Designs	III-19

IV

-1	SI Opportunities by Agency, GFY 1990-GFY 1995	IV-2
-2	Distribution of Type of Target Hardware Systems for Systems Integration Programs	IV-4
-3	Systems Integration Project Applications	IV-5
-4	Agency Preference for System Acquisition Methods	IV-20
-5	Preference for Type of Systems Integration Contractor	IV-21
-6	Selection Criteria Significance for Systems Integration Contract Awards	IV-23
-7	Commercial Vendor Selection Criteria	IV-26
-8	Technical Factors for Successful Completion of Federal SI Projects	IV-27

Exhibits (Continued)

IV

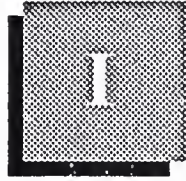
- | | | |
|-----|---|-------|
| -9 | Nontechnical Factors for Successful Federal SI Projects | IV-28 |
| -10 | Agency Suggestions for Improvements to Vendor Services | IV-29 |
| -11 | New Technologies Required for Agencies' SI Projects | IV-30 |

V

- | | | |
|-----|---|------|
| -1 | Top Ten SI Vendors in the Federal ADP Market—CY 1989 | V-2 |
| -2 | Federal Systems Integration Business by Service Category | V-19 |
| -3 | Summary Corporate Data of SI Respondents | V-20 |
| -4 | Factors Influencing Decision to Compete in Federal SI Marketplace | V-21 |
| -5 | Vendor Procurement Approaches to Federal Systems Integration | V-22 |
| -6 | Vendor Views of Agency SI Opportunities—GFY 1990 – GFY 1995 | V-23 |
| -7 | Agencies Offering the Most Attractive SI Opportunities | V-24 |
| -8 | Importance of Technologies to Federal SI Projects | V-25 |
| -9 | Commercial versus Federal Systems Integration Characteristics | V-27 |
| -10 | Respondents' Forecast of Revenue Growth | V-29 |
| -11 | Agencies' View: Attractive Characteristics of SI Approach | V-33 |
| -12 | SI Vendors' Rankings of Selection Criteria for SI Contract Awards | V-34 |

B

- | | | |
|----|--|-----|
| -1 | Information Services Industry Structure—1990 | B-2 |
| -2 | Software Products | B-5 |



Introduction

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The Federal Systems Integration Market, 1990-1995 is a revision of an earlier report issued in December 1989. It has been revised in response to continuing client interest in this changing market. The 1990 update identifies market issues and trends that affect vendors and systems integration contractors entering the market through FY 1995. Current contractor guidance and insight into the latest agency requirements and perceptions are offered to help vendors plan their strategies to compete for federal systems integration contracts during the 1990-1995 period. This report also includes the results of new agency and vendor surveys.

This report on systems integration activities focuses on the federal government and was prepared as part of INPUT's Federal Information Systems and Services Program (FISSP). Reports issued through this program are designed to help INPUT's U.S. industrial clients in planning how to satisfy future federal government needs for computer-based information systems and services. The report's findings are based on research and analyses of several sources, including the following:

- INPUT's Procurement Analysis Reports (PARs)
- OMB/GSA/NIST Five-Year Information Technology Plans for 1990-1995
- Interviews with leading federal systems integration contractors
- Interviews with federal agency officials who manage existing systems integration contracts
- Interviews with prime contractors of existing systems contracts
- Federal agency GFY 1991 Information Technology Budgets

A**Scope**

The period covered in the report is GFY 1990 - GFY 1995. At the writing of this report, GFY 1991 has just begun.

Vendor interviewees were selected because they were identified as contractors of record for existing systems integration contracts or listed as systems integration services vendors in INPUT's Vendor Analysis Program data base for 1990. The case studies were made for systems integration projects that were identified through previous INPUT Procurement Analysis Reports (PARs) or suggested in conversations with clients. In order to obtain complete case study examples of awarded systems integration projects, INPUT interviewed agency program managers and representatives of the prime contractor of record on a specific project.

For the purposes of the 1990 study, INPUT defined "systems integration" to encompass the following categories of vendor products and services (see Appendix B for detailed explanations of each category):

- Equipment
- Software products
- Professional services
- Design
- Integration
- Software development
- Education/training
- Documentation
- Systems operations (facilities management of client-owned systems)
- Other products/services

B**Methodology**

The OMB/GSA/NIST Five-Year Plan for the INPUT Procurement Analysis Reports was reviewed for programs to be initiated during the GFY 1990 - GFY 1995 period. INPUT also researched agency long-range plans for major systems replacements and new system initiations (new starts) for the same time.

For agency and vendor respondents, INPUT developed new questionnaires designed to acquire summary data on programs awarded to systems integration contractors. All case study examples were at least one year into the contract life cycle.

C**Report Organization**

This report consists of five additional chapters:

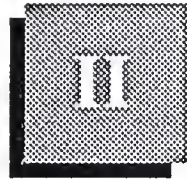
- Chapter II is an executive overview describing the major points and findings in the report.

- Chapter III provides the market analysis and forecast, and describes the major market issues and trends affecting the industry.
- Chapter IV summarizes federal agencies' requirements of systems integration contractors and includes case study examples of systems integration projects.
- Chapter V presents vendor perspectives on the federal systems integration market, and short company profiles on this market segment's players.
- Chapter VI provides a sample of business opportunities, presented by programs and initiatives in the federal market that anticipate seeking the services of a systems integrator contractor.

Several appendixes are also provided:

- Interview profiles
- Definitions
- Glossary of Federal Acronyms
- Policies, Regulations, and Standards
- Related INPUT Reports
- Questionnaires

A description of INPUT and its programs and services follows the appendixes.



Executive Overview

A

Federal Market Issues Systems integration procurements are fueled and delayed by budget constraints. The constraints tend to enhance prospects for vendor services, as opposed to the government's providing services through in-house resources. However, budget constraints also often delay SI initiatives. Federal market issues are shown in Exhibit II-1.

EXHIBIT II-1

Federal Market Issues

- Budget constraints
- Federal policies and regulations
- Software integration and productivity improvements
- Artificial intelligence
- Other uncertainties and issues

Federal policies and regulations play an important role in the systems integration market. The Competition in Contracting Act (CICA), the Paperwork Reduction Act, and the Procurement Integrity Act, in their existence and their demise, have all had an influence on large systems integration procurements.

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Software integration and productivity improvements impact the federal systems integration market. As new hardware technologies are put into place, the next generation of software must accommodate change and communications between incompatible equipment. Agencies are increasingly required to merge large applications into a single, transparent software system that fits users' needs.

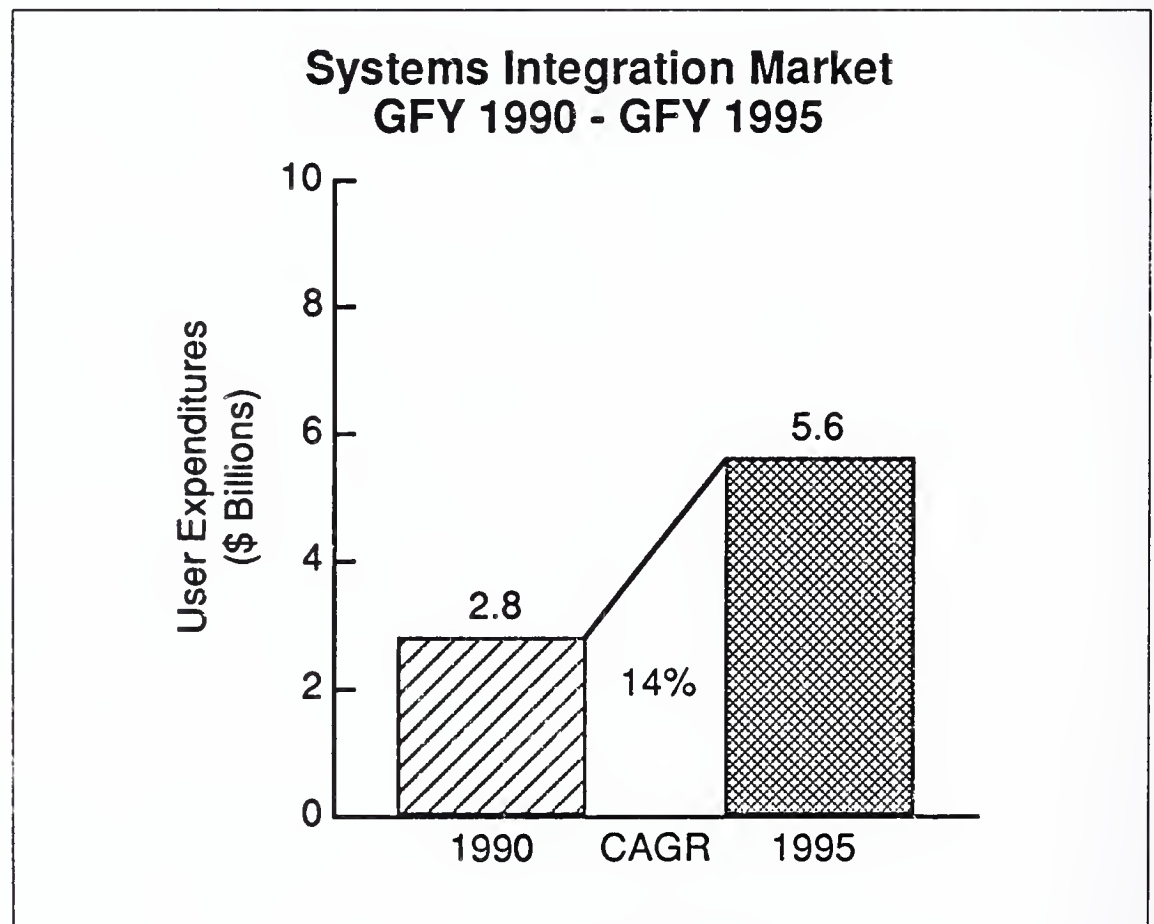
Artificial intelligence is a market segment in which vendors are focusing on introduction of new technology to the government. In meeting federal systems integration needs, vendors must often include AI features as part of their offerings. The DoD is taking the lead in developing artificial intelligence programs.

B

Market Forecast

As shown in Exhibit II-2, INPUT expects the federal systems integration market to grow from \$2.8 billion in GFY 1990 to \$5.6 billion in GFY 1995, at a CAGR of 14%. This growth rate is diminished from last year's. Sizable budget cuts or level budgets at many agencies, especially on the Defense side, account for the loss of growth.

EXHIBIT II-2



Federal systems integration projects will shift in emphasis from hardware to software and services. Growth in software products is largely determined by OMB pressure, software certification trends, and packaged software availability, all of which are expected to increase. The increasing availability of custom software tools will drive the growth in software products. The growing shortage of federal technical professionals is fueling the need for additional contractor consulting support.

Computer and communications equipment will show lower growth than the other systems integration delivery modes. Federal agencies intend to put more software on each hardware system. This will give them greater functionality from their capital investment.

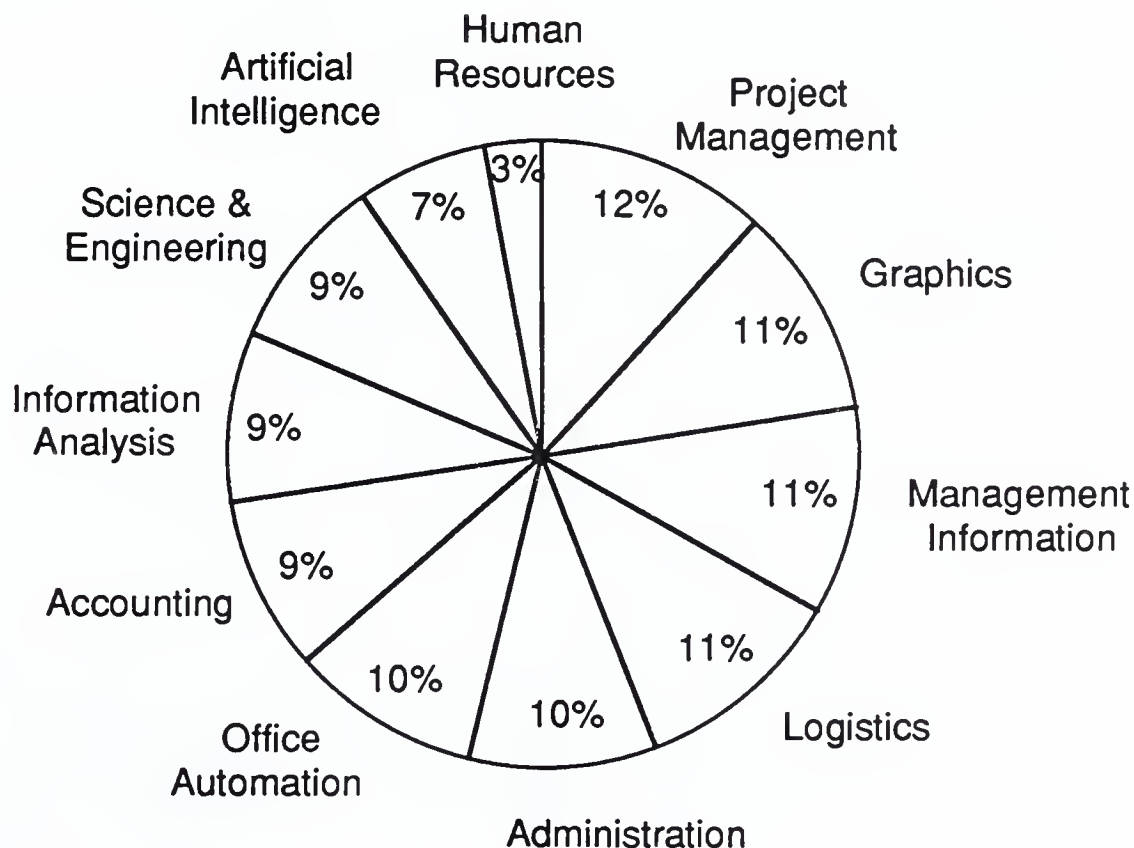
C

Primary Applications

INPUT made a new survey of the market for various types of information resource applications. Results are in Exhibit II-3.

EXHIBIT II-3

Federal Systems Integration Market by Type of Application



Primary and secondary applications are categorized.
Note: Figures do not add up to 100% due to rounding.
Source: INPUT agency survey

The applications forecast represents federal agencies' estimates of which applications will require systems integration support services. A number of SI programs note that additional applications will be added later in the program by contract or in-house staff—without specifying the applications. INPUT expects more mission-oriented applications in the near future as staffing constraints force agencies into contracting out more mission support. In SI replacement programs, not all of the resident applications to be converted to the new machine are specified.

D

Competitive Forces

Competitors vary in size, growth, and rates—and also vary with the projected value of the SI project, applications, sponsoring agency, and end user of the system. INPUT lists the top federal SI vendors in the order of reported expenditures in Exhibit II-4. It should be noted that vendors report their revenues in different ways, and some projects may be viewed as systems integration by one firm and not by another.

EXHIBIT II-4

Top 5 SI Vendors in the Federal ADP Market, CY 1989

Rank	Vendor
1	IBM Corp.
2	Electronic Data Systems (EDS)
3	Science Applications International Corp. (SAIC)
4	Martin Marietta
5	Computer Sciences Corp. (CSC)

Note: Ranked in order of reported federal SI revenue for CY 1989.

Many of these same firms are also leaders in the commercial systems integration market. There are many up-and-coming systems integration firms that did not make this list. Although many have higher growth rates or higher overall revenues than the listed systems integrators, their revenues from federal systems integration activities do not yet equal those in Exhibit II-4.

There is an increasing trend for vendors to serve a wider range of federal agencies. Further, many SI vendors that had not previously targeted the commercial SI market are now doing so. They wish to broaden their business base to hedge their bets on the federal SI market, and also leverage their federal experience.

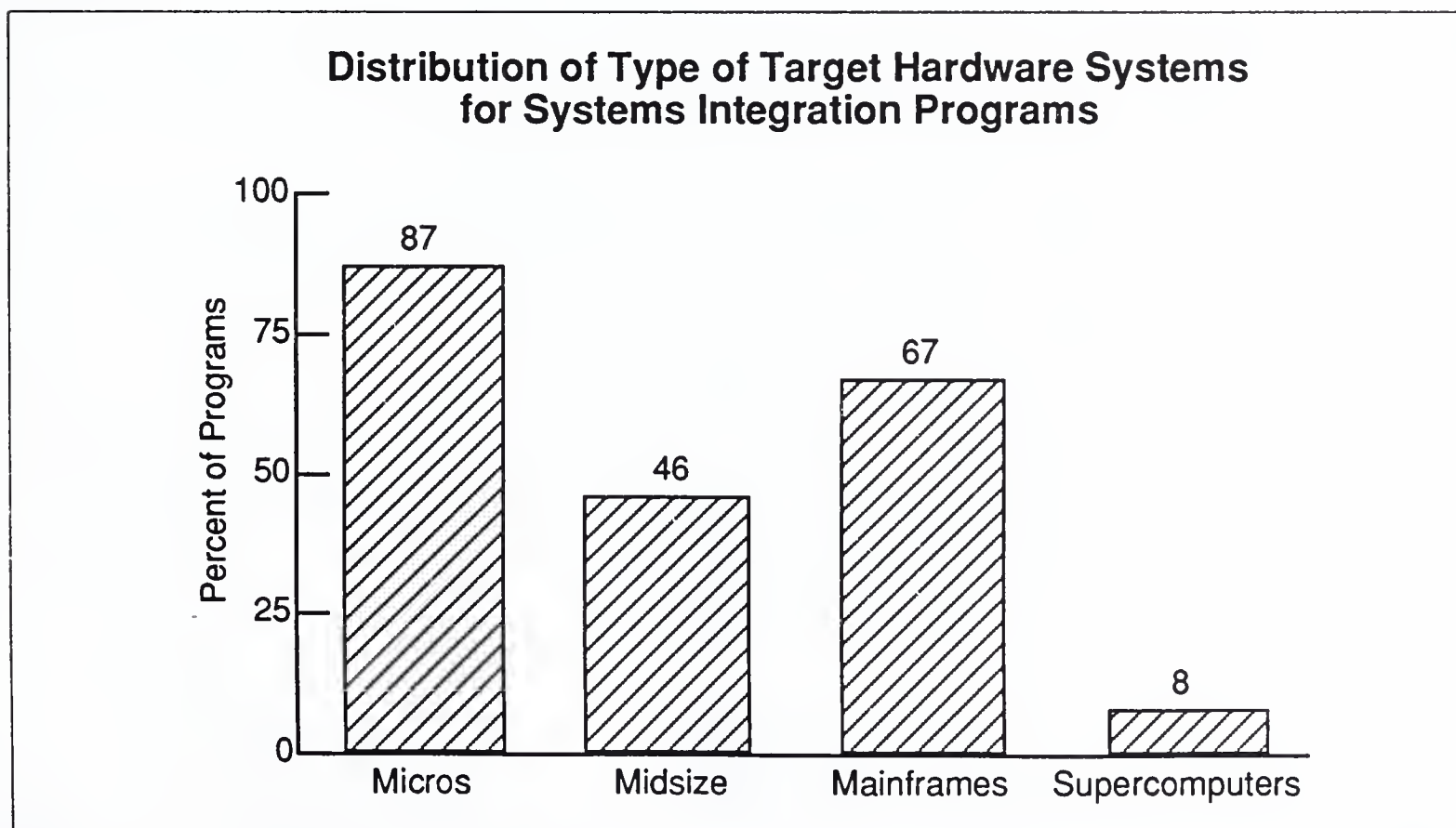
Vendors are attracted to the federal SI market by its growth potential and related benefits. Most vendors will try to win major SI contracts, but many others will work toward competitive niche jobs. However, for most of these vendors, SI is only one component of federal strategy. Unfortunately, most vendors refer to themselves as systems integrators, even when use of the term does not mean the vendor could serve as prime contractor.

E

Agency Requirements

Computer equipment requirements are only partially identified in systems integration programs. There is a continuing strong need for mainframe computers (by more than two-thirds of the programs being reported on); nearly half the programs reported on include requirements for midsize computers and about seven-eighths of the programs include requirements for microcomputers, as shown in Exhibit II-5. As one would expect, complex SI projects frequently utilize a combination of equipment types to fulfill a variety of user requirements. The number of microprocessors, consisting of PCs and specialized workstations, applies only to planned major systems. The number of microprocessors to be acquired for a range of smaller applications may be considerably higher, by as much as one or two orders of magnitude.

EXHIBIT II-5



F**Recommendations**

As shown in Exhibit II-6, there are several key strategic elements to be considered in entering the federal SI market. Containing the risk element and consciously managing each project to reduce the possibility of failure is an essential part of continued participation in the market and the future of SI procurements in general. The vendor's reputation plays a key role in the proposal evaluation process.

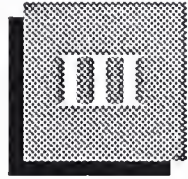
EXHIBIT II-6**Critical Success Factors in SI Projects**

- Risk containment and skillful management
- Vendor reputation
- Comprehension of procurement rules
- Technical ability
- Teaming partnerships
- Need to focus efforts

The SI vendor must understand completely the federal systems acquisition process. Systems design, programming, and project management talent are some of the most important components of the vendor's strategy.

Teaming partnerships are important because systems integration projects often have requirements that no single vendor can satisfy. A systems integrator must have partners that best complement the services and products that it can provide.

Finally, the SI market will become increasingly competitive in the next five years. Vendors now must choose the envelope of services, agencies, and skills that will be the focus of their SI efforts. Vendors have to identify the skills they want to develop, their potential teaming partners, and agencies to target.



Market Analysis and Forecast

A

Overview

INPUT has previously reported that the federal systems integration market was becoming more active, competitive, and controversial. This is still true. In terms of activity, many additional agencies have now begun to define their requirements in SI terms. In terms of competition, practically all major federal vendors now claim past or present SI experience, or future capability.

GSA (principally Frank McDonough) argued that the larger a project becomes, the more obstacles it encounters. The GSA Report, "An Evaluation of the Grand Design Approach to Developing Computer-based Application Systems," has not been published as of this writing. The GSA Administrator ordered the original report effort shelved—a contractor (AMS) is now completing the report. Some obstacles identified by the report include:

- Funding uncertainty during planning phase
- Heightened vendor protest activity
- Unrealistic schedules during planning phase
- Staffing problems throughout the project
- GAO audits

No matter how good a job the government agency does, any one of these obstacles may derail the effort. GSA argued for a more modular (procurement-oriented) approach to take advantage of little successes and better manage the obstacles. In GSA's view, visibility alone can damage many projects.

Problems related to large systems integration efforts occur at the same points as in other large-scale management projects: GSA imposes commodity procurement regulations onto agencies' planning efforts to provide for agencywide needs through long-term planning and acquisition

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strategies. Some agencies have attempted to meet their future needs through the 1990s by such long-term planning and acquisition strategies, only to be frustrated by zealous oversight and what agencies believe to be frivolous complaints from would-be contractors.

Two obvious examples are Treasury's Tax Systems Modernization and Navy's Stock Point ADP Redesign (SPAR) programs. More recently, Transportation's Computer Resource Nucleus (CORN) program was heavily criticized by GAO and subsequently GSA suspended CORN's delegation. In many cases, agencies will likely compromise with a top-down grand design and a bottom-up, modular implementation. However, this approach can dampen the systems integration growth rate a bit, especially if more agencies buy information system capabilities a piece at a time. DLA's new approach on the Logistics Systems Modernization Program (LSMP) is a case in point. INPUT's forecast takes this potential trend into account. However, various countervailing forces will still foster significant growth in the federal SI market.

Agency executives need trend analyses and status reports that accurately measure funding, staffing, and performance progress against performance measures developed to achieve mission objectives. Executives require accurate, up-to-date information management that integrates various diverse activities into a coordinated whole.

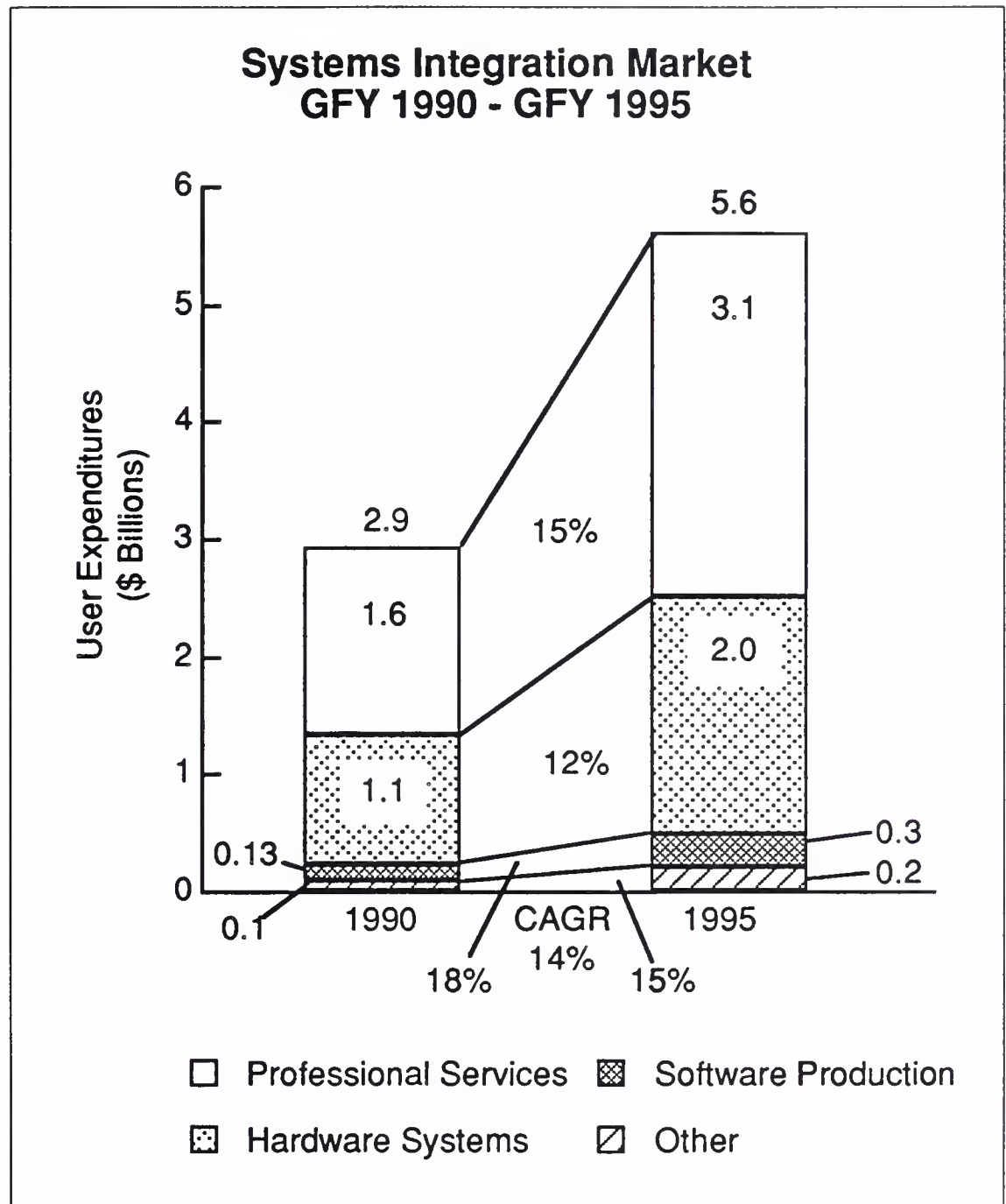
Key government agencies—OMB, GSA, GAO, and NIST—have initiated a progression of acquisition reforms intended to accelerate the acquisition rate and improve the management of information resources (ADP and telecommunications) while fostering wider competition. The recent adoption of GOSIP and POSIX as FIPS will promote the acquisition of OSI-compliant products that foster interoperability, connectivity, and upgradability of federal systems.

B

Market Forecast

The federal systems integration market will grow from \$2.8 billion in GFY 1990 to \$5.6 billion in GFY 1995, at a CAGR of 14% (Exhibit III-1). The overall market growth rate is diminished from that projected last year (14% this year vs 18% reported last year). The growth rates of mode forecasts, as explained below, also differ somewhat from last year's forecast: growth rate for the equipment portion of SI has declined from 15% to 12% over the past year, reflecting sizable budget cuts at many agencies, especially on the Defense side.

EXHIBIT III-1



Professional services are forecast to increase at 15% annually (down from 18% reported last year). This increase reflects the growing impact of national concern for the economy (mostly the growing national debt, but partly concern for the impact of the potential for war in the Middle East). Acquisition of software products will increase at 18% annually (down from 21% reported last year). Other products and services will increase at 15% annually (down from 21% reported last year), reflecting the area of greatest economizing in times of economic stress.

1. Delivery Mode Forecast

INPUT divides systems integration activities into four subdelivery modes:

- Professional services
- Software products
- Equipment systems
- Other

This approach permits a more comprehensive comparison between the modes and with the commercial market. As illustrated in Exhibit III-1, the various modes will grow at differing rates. This difference reflects the expected shift of emphasis from hardware (12% annual growth) to software (19% annual growth) and services (16% annual growth) in systems integration projects over the next five years.

The professional services portion of the systems integration market is expected to grow from \$1.6 billion in GFY 1990 to \$3.1 billion in GFY 1995, a CAGR of 15%. This growth does not include all of the federal professional services market—only that portion devoted to systems integration. The SI-related professional services include the following categories:

- Program Management
- Consulting
- Design
- Integration
- Education and Training
- Documentation
- Systems operations (facilities management of client-owned systems)

In general, the federal professional services market continues to grow, but the systems integration portion is expected to grow faster. Further, INPUT has noted a growing trend to include systems operations as a part of systems integration contracts. The growing shortage of federal technical professionals is fueling the need for additional contractor consulting support.

Many agency IT budgets for GFY 1990-1991 have increased dramatically in the operations and maintenance line of the OMB Circular A-11 section 43A exhibit.

Growth in software products is largely determined by OMB pressure, software certification trends, and packaged software availability, all of which are expected to increase. In response to growing demands for functionality by agency customers, INPUT expects more packaged software to be installed per system. The increasing availability of custom software tools (sometimes referred to as analysts' workbench and programmers' workbench) will drive the growth in software products.

Software products consist of standard software packages, with little or no modification, which can be used effectively in a variety of situations. In addition to being more reliable and having a larger user base to report errors, software products are also more cost-effective because of dramatically lower unit costs (for the same reason) when compared to custom software development.

The software products portion of the systems integration market should grow from \$130 million in FY 1990 to \$300 million in FY 1995, a CAGR of 19%. The factors cited above account for most of the growth in this segment. In particular, the availability of packages to meet agency needs will support this growth.

After professional services, computer and communications equipment continue to account for the next largest share of the federal systems integration market. However, equipment's 15% CAGR will lag behind all the other components, and is comparable, in part, to the lower overall growth rate (5%) of the overall federal equipment market, as reported in several other INPUT federal market reports. The growth rate also illustrates the declining unit costs of equipment, as expressed in price per throughput or capacity to do work. Finally, as previously discussed, the lower rate indicates agency intentions to realize greater functionality from their equipment investment, largely by putting more software on each hardware system.

The "other" service mode includes outlays for site preparation, installation, test equipment and tools, processing services and networks for tests and simulations, and test and acceptance activities. This subdelivery mode of the federal SI market will grow from \$100 million in GFY 1990 to \$200 million in GFY 1995, at a CAGR of 15%. This growth rate reflects increased spending for support services. The government is using profit and not-for-profit contractors to assist in the test and acceptance process.

2. Agency Forecast

Civilian SI spending forecast for the GFY 1990-1995 period exceeds that of Defense by almost one and a quarter billion dollars, as shown in Exhibits III-2 and III-3. This balance reflects current budget constraints in the Defense Department. INPUT expects these constraints to continue throughout the forecast period. Most major SI initiatives, however, are not being cancelled, although some may be deferred or stretched. As shown in Exhibits III-2 and III-3, the civilian market will grow slightly faster than the defense market over the next five years. The civilian market also starts from a somewhat higher base. Most growth will occur in the middle years, as latent demand grows; then the growing impact of budget cuts begins to show its impact.

EXHIBIT III-2

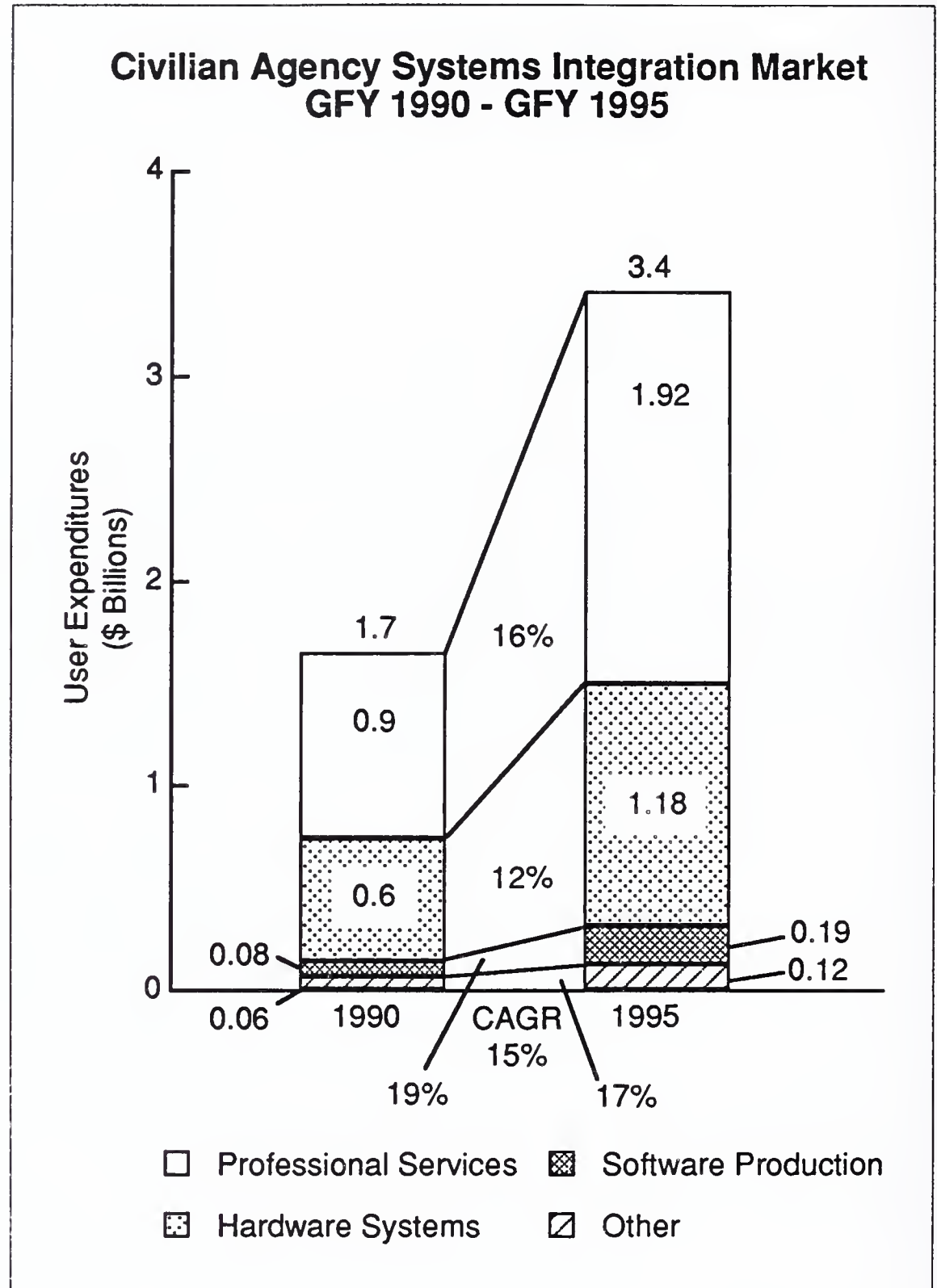
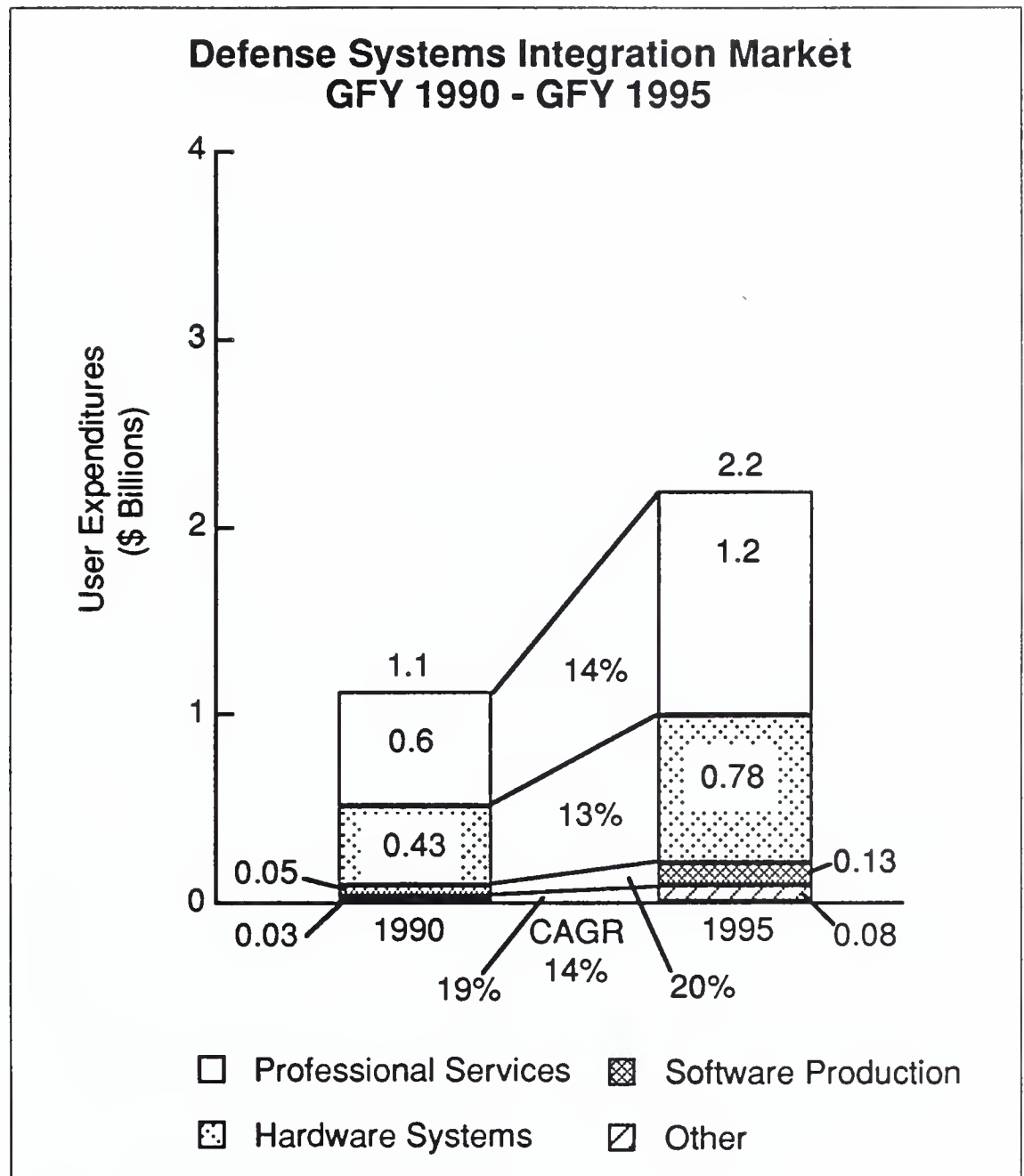


EXHIBIT III-3



The agency integration market forecasts are based on a combination of long-range IRM plans, projection of previous Information Technology Budgets, programs described in the agency OMB A-11 Section 43 A & B budget requests, and interviews with policy officials and ADP center managers. Only programs specifically identified by agencies in their planning documents and funding request submissions are included. Generally, programs with a life cycle cost greater than \$1 million are included. The number of identified integration programs for custom systems integration is shown in Exhibit III-4 (individual programs are identified in Chapter VI).

It should be remembered that not all SI efforts involve major expenditures. In fact, some efforts can be quite modest and can provide small vendors with the experience needed to take on larger tasks. However, the numbers cited in Exhibit III-4 refer mainly to the larger projects. It

should be noted that the funding totals can be misleading, since projected funding for some programs is not available. Please refer to Chapter VI for more detailed information.

EXHIBIT III-4

Custom SI Initiatives by Agency GFY 1990 - GFY 1995

Agency	Total	Funding (\$M)
Defense		
Air Force	6	240.2
Army	12	2,816.5
Navy	5	133.2
Marine Corps	1	0*
Defense Dept.	5	207.1
Subtotal	29	3,397.0
Civil		
Agriculture	3	106.5
Commerce	2	199.1
EPA	1	0*
GSA	1	78.8
H&HS	2	0*
H&UD	1	133.0
Interior	2	202.7
Justice	4	532.6
Labor	1	0*
NASA	3	0*
OPM	1	55.3
State	2	0*
Transportation	2	29.7
Treasury	4	1,833.3
U.S. Courts	2	10.0
Veterans Affairs	1	0*
Subtotal	32	3,181.0
Total	61	6,578.0

*Funding not identified

Source: INPUT Procurement Analysis Reports

No estimate is available for the cost or funding of planned conversion of applications from other information processing resources to new in-house systems. The current resources include remote computing services, systems operations, and government data centers outside the agency. The level of monthly costs for running the application are not provided.

The representative agency SI program budgets are a combination of part of their IRM systems upgrade and replacement budgets and most of their new systems acquisition budgets. This list excludes programs that have recently been awarded, such as the DLSC Data Base Redesign or the Army Corps of Engineers Automation Plan, and programs that are currently in source selection. The overall forecast does anticipate the approval and funding of these programs. This year, most acquisitions consist of either system expansions/upgrades of current systems or of new starts (including major consolidations/redesigns of related existing systems).

The proportion of agency programs designated as upgrades, replacements, and new systems is discussed further in Chapter IV.

3. Applications Forecast

In a new INPUT survey, defense and civil agencies identified information resource applications by a wide variety of titles. Each of the military departments and defense agencies provided different codes and/or acronyms for such common commercial applications as personnel, payroll, distribution, and accounting.

Applications have been converted to INPUT's terms as defined in Appendix B. Variations on applications for particular functions are grouped with the basic application. This normalization process facilitates analysis of the data. The reader should note that some of the listed applications suggest office automation—they actually represent, however, a growing movement of substantive computational applications down to local (largely microcomputer-based) equipment under the control of the end user. Primary and secondary applications for systems integration initiatives as identified by agencies are shown in Exhibit III-5. More-specific information on current SI opportunities is provided in Chapter VI.

The applications forecast is not intended to be an accurate prediction; rather, it represents federal agencies' estimates of which applications will require systems integration support services. A number of SI programs note that additional applications will be added later in the program by contract or in-house staff without specifying the application. INPUT expects more mission-oriented applications in the near future as staffing constraints force agencies into contracting more mission support. In SI replacement programs, not all of the resident applications to be converted to the new machine are specified. The implied trend of the identified operating systems and applications is discussed in greater detail in Chapter IV.

EXHIBIT III-5

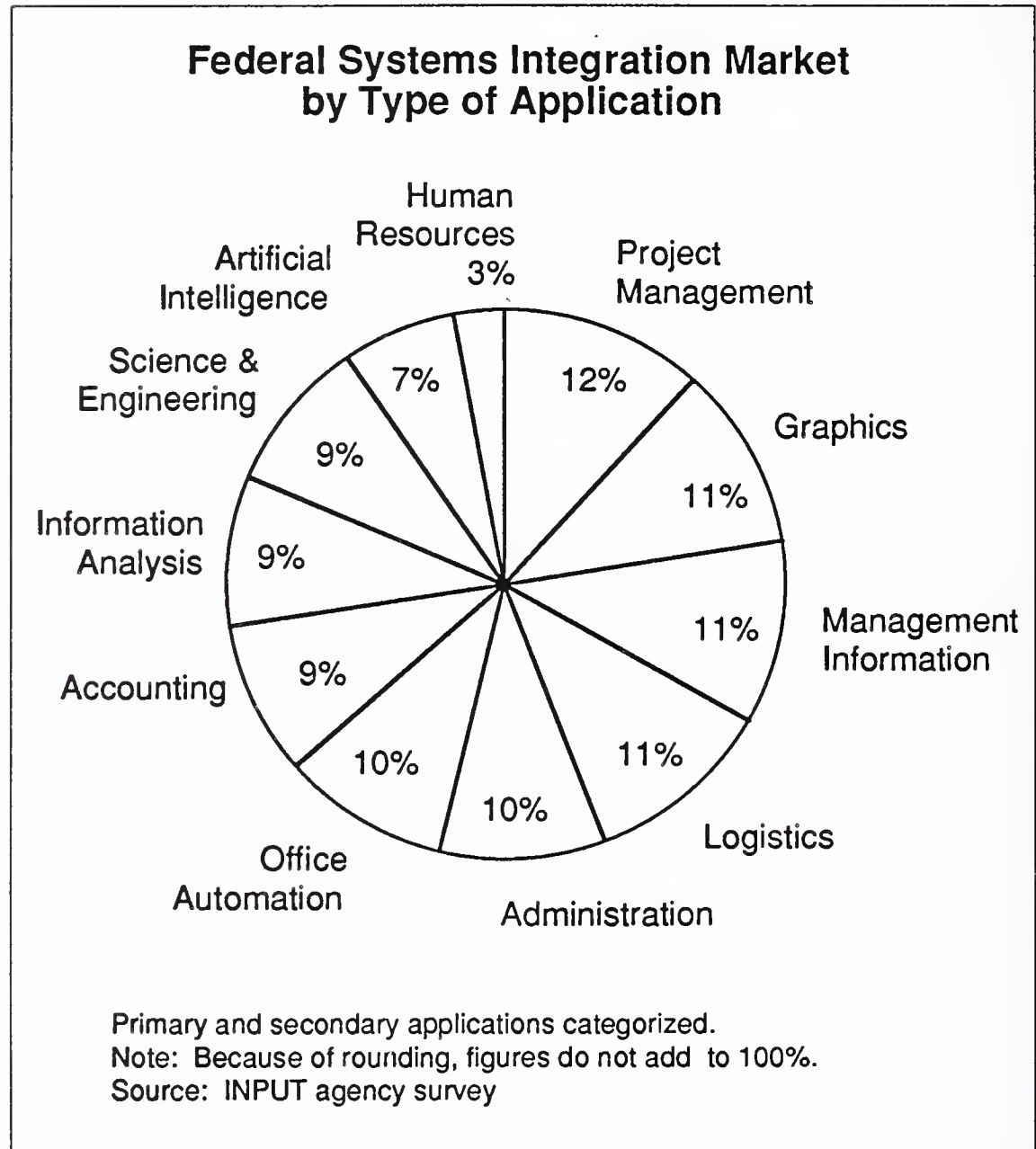


Exhibit III-5 shows that in the INPUT SI applications survey, artificial intelligence achieved only a 7% rating from the survey sample. INPUT expected this percentage to grow from last year (8%). However, it is clear that increasingly severe budgetary constraints require federal agencies to cut back their activities in application areas that cannot clearly be shown to provide a timely payback.

C

Competition

Competitors vary in size, growth, and rates—as well as with the projected value of the SI project, applications, sponsoring agency, and end user of the system. Brief profiles of the top ten federal SI vendors are provided in Chapter V.

Potential competitors for each category of systems acquisition are identified by service category. Some vendors compete in several categories because they offer products and/or services over a number of commercial and government sectors, including:

- Specialized integrated systems
- Midsize/microcomputer-based systems
- Midsize/microcomputer network-distributed data systems
- Large CPU-based systems with or without distribution networks
- Supercomputer systems that are frequently the host of several mainframes that may support distributed midsize computer and microcomputer terminals

1. Top Ten Systems Integrators

The INPUT list of the top ten SI vendors in CY 1989 is based on announced contract awards, interviews of earlier INPUT Procurement Analysis Reports of SI activities, and cumulative reports from CBD notices and other sources on contracting activity.

In Exhibit III-6, INPUT lists the top ten federal SI vendors in order of reported expenditures. It should be noted that vendors report their revenues in different ways, and some projects may be viewed as systems integration by one firm and not by another. However, the list in Exhibit III-6 represents a reasonable estimate of relative market positions.

Brief profiles of each of these firms can be found in Chapter V of this report. Many of these same firms are also leaders in the commercial systems integration market. IBM, EDS, Unisys, and Control Data Corporation are also included in the top ten list for commercial systems integration.

There are many up-and-coming systems integration firms that did not make this list. Although many have higher growth rates or higher overall revenues than the listed systems integrators, these firms' revenues from federal systems integration activities do not yet equal those in the exhibit.

EXHIBIT III-6

Top 10 SI Vendors in the Federal ADP Market CY 1989

Rank	Vendor
1	IBM Corp.
2	Electronic Data Systems (EDS)
3	Science Applications International Corp. (SAIC)
4	Martin Marietta
5	Computer Sciences Corp. (CSC)
6	Unisys
7	Boeing Computer Services (BCS)
8	Grumman Data Systems (GDS)
9	Planning Research Corp. (PRC)/Black & Decker
10	Control Data Corp. (CDC)

Note: Ranked in order of reported federal SI revenue for CY 1989.

2. Professional Service Vendors

The larger professional service vendors are usually prime contractors or system engineers/integrators in the federal SI market. Other professional service companies have smaller, more limited offerings to the federal SI market or are involved through separate contracts with the contracting agency. These other companies include accounting firms and management service firms.

The field of accounting firms and management service firms in the SI market has been narrowed due to an unprecedented number of mergers. Deloitte, Haskins and Sells merged with Touche Ross to form Deloitte and Touche. Ernst and Whinney merged with Arthur Young to create Ernst and Young. Other firms in this field include Arthur Andersen (Andersen Consulting); Coopers and Lybrand; KPMG Peat Marwick; Booz-Allen & Hamilton; American Management Systems; and Bolt, Beranek, and Newman. These firms specialize in financial, budget, accounting, and management services applications.

3. Equipment Vendors

The major midsize- and large-CPU vendors are also contenders for contracts for SI programs because most offer upward-compatible CPUs for systems being replaced and newer systems with enhanced capabilities. These vendors include Amdahl, AT&T, CDC, Cray, DEC, DG, Gould, Harris, Hitachi Data Systems, HP, HFSI (now owned by Groupe Bull), IBM, NAS, NCR, NEC America, Prime, Rolm, Stratus, Tandem, Tektronix, Unisys, Wang, and Zenith.

4. Foreign Competition

The prospect of hardware systems competition from the Far East and Western Europe for nonsensitive administration, management, and office automation projects is not expected to become a major factor until trade relations improve. The popularity of the "Made in America" campaign, coupled with the government's desire to remove trade barriers to reduce the trade imbalance, places restrictions on the amount or type of business foreign competitors can currently secure. One solution for foreign firms has been to buy American firms in order to break into a business. Two examples are Hitachi's 80% ownership of National Advanced Systems, and Groupe Bull/Honeywell's recent purchase of Zenith Federal Systems.

D

Federal Market Issues

During the two most recent administrations, presidential task forces investigated the problems and technological status of the federal government's information processing resources. Findings are shown in Exhibit III-7.

EXHIBIT III-7

Federal Information Processing Weaknesses

- Slow to adopt new technology
- Obsolete ADP inventory
- Ineffective management of ADP resources
- Inadequately trained personnel
- Insufficient information processing for public needs

These findings, along with fundamental changes in GSA's information systems (IS) management policies, led to gradual changes in IS procurements. These changes support the need for integrated solutions.

Systems integration procurements are fueled and delayed by budget constraints. The constraints tend to enhance prospects for vendor services, as opposed to the government's providing services through in-house resources. Agencies' requirements for large integrated systems may also be changed if GSA revises its rules on granting DPAs (Delegations of Procurement Authority) to force adherence to a more modular approach.

Deficit control measures, such as the Gramm-Rudman-Hollings (GRH) Act, are forcing agencies to cancel programs that do not satisfy tight productivity improvement requirements. Other programs that do not meet urgent or emergency mission requirements are delayed or stretched out over time. At this writing, the FY 1991 IRM budget is still being debated. Several amendments that are potentially devastating to programs have been offered.

Systems acquisitions in the second half of the 1980s addressed needed improvements in management, administration, human resources, and logistics functions that had not been moved to newer data processing resources in more than a decade. These acquisitions have been manifested in the focus of systems integration procurements.

1. Federal Policies and Regulations

Agencies and vendors face difficulties in complying with the sheer number of federal policies and regulations while trying to fulfill information processing requirements.

GSA intended that the FIRMR would streamline the information resources acquisition process. GSA recently completed a rewrite of the FIRMRs to reflect significant legal and regulatory changes, as well as to expedite procurements. However, with different versions of a Paperwork Reduction Reauthorization Act still pending in Congress, the FIRMRs will likely require further rewrites.

Other regulations and policy initiatives that are changing the acquisition procedures include:

- The Competition in Contracting Act (CICA) of 1985 provided expanded legal powers for ADP protest action via the GSA Board of Contract Appeals (GSCA) and GAO, increased the opportunity to employ negotiated contracts, and established seven more-restrictive categories of exceptions that permit sole-source awards. Agencies

view the CICA as allowing vendors to complicate and lengthen the acquisition process. The Act's provisions make it easier for vendors to protest procurement activities and bring temporary halts to procurement schedules. Virtually every major procurement has been protested in terms of violations of the CICA.

At this writing, the Paperwork Reduction Reauthorization Act of 1986 has expired without replacement legislation being passed. The Paperwork Reduction Reauthorization Act expanded the power of the GSBICA, but also retained the Warner Amendment, which provides DoD with mission-critical ADP procurement exemptions to Brooks Act coverage, except for application of general-purpose ADPE in noncritical functions, such as testing, recalibration, and programmer workbenches.

Several other issues are now being studied. These include software rights, data rights, and second-sourcing of systems. INPUT expects these issues to continue to create problems on some hardware procurements, including systems integration.

As is well known in the vendor community, the CICA has not achieved the expected improvement of competitive opportunities, nor more-equitable resolution of protests. The results have been anything but equitable. Most successful protests result from one or more of the following defects:

- Failure to follow stated evaluation plans
- Procurement process inconsistencies
- Improper documentation
- Defective pricing
- Inconsistent information dissemination

GSA's limited procurement review of the past few years has eliminated much of the expert examination of procurement actions. Many vendors now believe that more review is needed. Some have even indicated that, in certain circumstances, losing can be more profitable than winning. Within the past year, the pendulum has shifted back to heavier agency oversight by GSA. In fact, some programs have been singled out for especially comprehensive review, in much the same way that some tax returns are heavily audited. GSA is committed to increasing oversight without unduly delaying agency procurements.

Another law with negative effects on federal procurements is the Procurement Integrity Act. The Act—which went into effect on July 16, 1989—was written to ensure that no bias has infringed on the procurement process. It required procurement officials to certify that they have complied with the law and that all members of their contracting team also complied with its provisions. The law carried penalties for both government contracting officials and vendors, including fines and imprisonment.

However, in December, 1989, President Bush signed the Ethics in Government Act, popularly referred to as the Congressional Pay Raise. This law suspended the Procurement Integrity Act for one year. At this writing, Congress is debating another six month extension to the suspension. Congressman Jack Brooks and Congressman John Conyers oppose the extension.

Prior to the suspension, the effect of the Procurement Integrity Act was to galvanize contracting officials into inaction. Most of the contracting officials in the government did not fully understand the law, and they feared the penalties associated with violating the law. Thus the contracting officials would often do nothing rather than risk a violation.

2. Budgetary Constraints

Future-year funding of current acquisition programs and approval of funding for the next budget year are always in doubt in the federal government market. The authorization of an agency budget and the requested information sources by the agency oversight committee do not assure the agency or vendors that funds will be provided in the out years. Appropriation Acts for the agencies approve the TOA (Total Obligational Authority) for certain large systems, but not the fiscal year or years in which the funds will be available (called outlays).

Continuing economic and political sensitivity to the large national budget deficit is beginning to affect adversely a number of acquisitions in the less-than-critical defense and civil technology sectors. Major IRM systems already approved are likely to continue in preference to unapproved programs. Furthermore, ongoing production, through operational support contracts, must continue. However, see Exhibit IV-1, in which federal agencies estimated a greater need for new-start efforts than replacements efforts.

INPUT expects budget difficulties to continue to constrain the federal information systems market, particularly on the Defense side. However, if the procurement process is simplified to reduce the protest volume, acquisitions should begin to increase. Many view information systems as key to productivity increases. Therefore, budget constraints sometimes lead to increased opportunities in the information systems market.

3. Software Integration and Productivity Improvements

Software is the interface medium between machines, applications, and end users. Agencies need strategies and vendor support to implement these integrations. Agency respondents in previous studies noted a growing need for portable software that is readily adaptable to a changing hardware environment. As new hardware technologies are put in place, the next generation of software must accommodate change and communications between incompatible equipment.

Similarly, agencies are increasingly required to merge large applications into a single transparent software system that fits their users' needs, rather than government users adapting their needs to the capabilities of the software.

To modernize software and effect productivity improvement, agency ADP organizations are seeking greater use of:

- Software engineering technologies, including more-efficient software management methods, software development methodologies, and data dictionaries
- Higher-level development tools, including program generators and fourth-generation languages
- Better analytic tools for all sizes of machines—microcomputers, mid-size computers, and mainframes—that will provide programmers with development aids such as automatic documentation, cross-referencing, etc. Many SI programs include requirements for these technologies.

One approach—data administration—provides techniques and software tools to arrange large amounts of data. By organizing, indexing, and cross-referencing data according to the business requirements of the organization, agencies are better equipped to plan procedures for the comprehensive development of future systems. Specifications from the American National Standards Institute (ANSI) are now being reviewed by agencies and vendors. Although a standard data dictionary software specification is some years away, vendors, especially of data base management systems (DBMSs), need to be cognizant of the pending impact of this trend.

Agencies fourth-generation languages (4GLs) to increase productivity in software development and maintenance. Currently, 4GLs are used primarily for end-user computing and reports, along with some decision support. Other applications for 4GLs are being designed and will eventually ease the burden on agency staff; government computer resources experts are concerned with the demand on computing capability of 4GLs and will look for 5GLs with improved efficiencies. Many information systems procurements include requirements for 4GL experience. Advanced hardware designs, including Reduced Instruction Set Computing (RISC), will make (traditional) inefficient 4GLs more feasible. As a result of steadily declining hardware costs and increasingly powerful and faster computers, software inefficiency will matter less than it used to.

4. Artificial Intelligence

Artificial intelligence is a market segment in which vendors are focusing on introduction of new technology to the government, primarily in the areas of software development efforts and decision support. Currently, expert systems (which are a popular subset of the family of AI capabili-

ties) are being developed by agencies as standalone end-user production systems to automate knowledge-based processing. In meeting federal systems integration needs, vendors must often include AI features as part of their offerings.

The DoD is taking the lead in developing artificial intelligence programs. AI is providing useful training for analysts, and applications are being employed in tactical situations and support functions. Civil agencies are also developing and operating expert systems for large-scale information processing. In a previous report, INPUT reported that decision support systems represent the most common government application of AI. However, AI is also being used in the development of micro security products.

Industry views the current AI opportunities to be in product-oriented services for prototyping systems for the federal agencies. As in other software areas, the government is looking to industry for solutions, not just products. Therefore, in response to this trend, AI vendors are expected to migrate beyond standalone systems to new products that integrate approaches and solutions. AI is expected to aid in developing closer links to the main flow of an agency's information processing.

Many small AI vendors are focusing their marketing efforts on SI directors and are providing products to facilitate information storage and retrieval, data communication, and other typical management functions. Current federal prototyping efforts are demonstrating AI feasibility in those SI functions as well as other decision support areas. Areas in which federal workers must interview the public seem especially promising for AI. In a previous report, INPUT found that many federal AI applications were being applied to specialized midsize computer systems.

5. Uncertainties and Issues

Federal agencies, in their attempts to consolidate disparate IRM systems, are bundling their requirements for information systems into massive contracts. These large projects are causing big problems in the time it takes to implement them, the cost of the system, and the overestimation of the systems' capabilities. Another problem with large-scale projects is the lack of agency staff and managers with the necessary experience, skills, and management authority.

Over the past year there has been rethinking on the issue of "grand design" systems integration projects. In 1988, GSA wrote a report entitled "An Evaluation of the 'Grand-Design' Approach to Developing Computer-Based Applications Systems." The report outlined ten issue areas that have the most effect on grand designs, as shown in Exhibit III-8. The report cites several criticisms of the grand-design approach to

procurements, including a modular, incremental approach to the project. A more detailed version of the report was due in December 1989. (Publication of the report has been deferred while a contractor (AMS) moderates the conclusions and recommendations.) The final Grand Design report is expected to detail specific alternatives to large-scale SI programs.

However, many of the criticisms of the grand-design systems approach can also be applied to the modular approach. Planning, personnel training, coordination problems, funding, and interoperability are required for either approach to be successful. Grand-design and modular projects must in the end be tied together into integrated systems. The real difference between the two approaches appears to be the contract vehicle. One potentially successful approach is that used by the Treasury Department in its Tax Modernization Effort—a 'grand design' project management process that incorporates individual procurements of equipment, software, and services where and when they are needed.

EXHIBIT III-8

Ten Issue Areas That Have the Most Effect on Grand Designs

- Coordination problems within the agency during the planning phase
- Procurement problems during the procurement phase
- Lack of acquisition skills during the planning and procurement phases
- Placing the program high enough in the organization in the planning phase
- Uncertain funding during the planning phase
- Audits by GAO during the planning and procurement phases
- Problems with contractors during procurement
- Staffing problems during planning, procurement and operations
- Problems with procurement regulations during the procurement phase
- Unrealistic time schedules during the planning phase

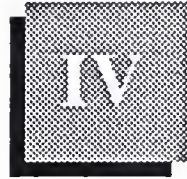
Source: Table 2 in Draft Report: "An Evaluation of the 'Grand Design' Approach to Developing Computer-Based Applications Systems," GSA, Information Resources Management Service, July 1988

Some systems integration vendors are in favor of a modular approach. This group of vendors believes that the modular approach is the only logical way to achieve the goal of developing a major system. These vendors would like to make a fundamental change in the way the government buys its systems. According to these vendors, procurements should be competed on a functional basis rather than on detailed specifications. The contract would then be awarded on the efficiency of the vendor's concept. This concept is along the lines of how commercial systems integration projects are done. The vendors would also rather develop these systems under something other than a fixed-price contract.

A variety of agencies are participating in GSA's "Go for 12" program, with varying results. Each agency will work with GSA in one of three pilot projects designed to model and test different aspects of the acquisition process. The three aspects of the program are the elimination of unnecessary bottlenecks in the acquisition process, the potential for parallel review of acquisitions, and the provision for special training in ADP and telecommunications acquisitions. The results and recommendations will be used to develop new procedures for use throughout the government. Up until now, however, very few federal initiatives have achieved the schedule objectives.

Probably the most vital solution to these issues is communications between the vendors and government. However, communications are impaired by protests under the Competition in Contracting Act and by the Procurement Integrity Act. Both laws hamper communications, and thus optimization of the procurement process is an unattainable goal.

Since part of the problem with large SI projects is the lack of expertise of federal managers, GSA has initiated the Trail Boss program. Under this program, senior IRM officials at civilian agencies are responsible for overseeing the contracting process of major acquisitions from beginning to end. The designees are given specialized training courses and aided in obtaining requisite authority and support from upper agency management to see a project through successfully. Vendors complain that the courses do not teach enough and that there are not enough Trail Boss trainees. The agencies oppose Trail Boss partially because of its focus on the individual rather than the agency.



Agency Requirements

A

Overview

The opportunities in the federal SI market appear in a number of agencies. Exhibit IV-1 presents the distribution of integration initiatives identified by agency and type of effort.

Expansion programs represent 41% of the SI market. More than half of these expansions are identified as requirements originating with the Department of Defense or the three military departments. This is a small decrease from the 1989 report (45%).

Replacement programs represent 18% of the market from FY 1990 to FY 1995. This percentage represents a small increase over the 1989 version of this report (15%).

The number of new SI programs is higher than in the 1989 version of this report. The new starts identified in this report represent a larger percentage (41%) of the federal SI market than was identified in last year's report (38%). INPUT has identified nearly one third again more systems integration efforts in this update of the report than were reported last year. The number of programs identified should not be interpreted as all-inclusive, but as representative of agency trends for SI projects over the next five years.

The small changes in percentages can be explained by the change in the stated goal of a project. During the development of an SI project, its definition and requirements can change before the RFP is released.

The total number of identified SI projects has increased somewhat from the 1989 version of this report; also, the number of projects within specific agencies has shifted. This is the result of the fulfillment and execution of some projects, and the development of new projects by other agencies.

EXHIBIT IV-1

SI Opportunities by Agency, GFY 1990-GFY 1995

Agency	Upgrade/ Expansion	Replace- ment	New Starts	Total
Defense				
Air Force	2	2	2	6
Army	5	2	5	12
Navy	4	0	1	5
Marine Corps	0	0	1	1
Defense Dept.	3	0	2	5
Subtotal	14	4	11	29
Civil				
Agriculture	1	0	2	3
Commerce	0	0	2	2
EPA	0	0	1	1
GSA	0	1	0	1
H&HS	0	2	0	2
H&UD	0	1	0	1
Interior	2	0	0	2
Justice	1	0	3	4
Labor	0	1	0	1
NASA	0	1	2	3
OPM	0	0	1	1
State	2	0	0	2
Transportation	0	1	1	2
Treasury	3	0	1	4
U.S. Courts	1	0	1	2
Veterans Affairs	1	0	0	1
Subtotal	11	7	14	32
Total	25	11	25	61

*Funding not identified

Source: INPUT Procurement Analysis Reports

B**Hardware Systems**

ADP hardware requirements are only partially identified in systems integration programs. Under A-109 guidelines, hardware systems are only functionally described but not specified until the selection of the final contractor. However, few agencies are even considering the conduct of A-109-type procurements. New system acquisitions below the A-109 thresholds are not usually permitted to specify particular brands. Rather, computer systems will be selected competitively after completion of system architecture design. Furthermore, in a number of defense administrative, accounting, and human resource applications, one vendor may supply computers to several systems with bulk purchase discounts under a requirements-type contract. Two examples of A-109 procurements are the Army's Reserve Component Automation System (RCAS) and the National Weather Service's Advanced Weather Information Processing System for the 1990s (AWIPS-90).

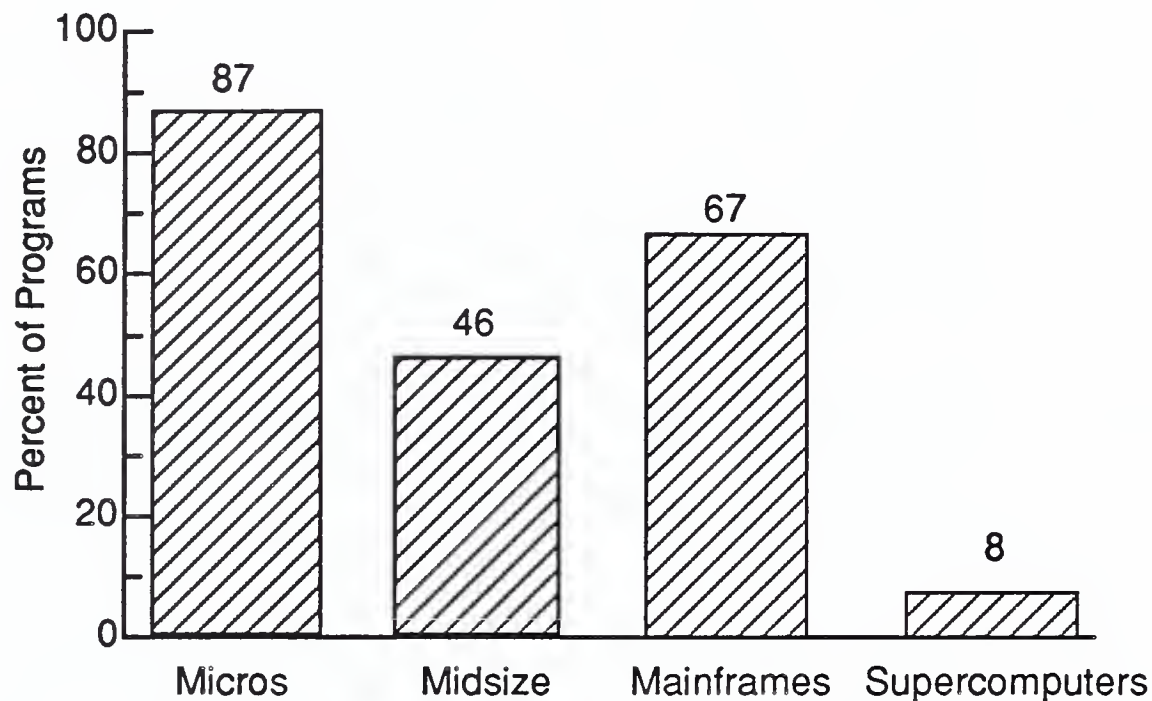
At this writing, two systems integrators, Boeing Computer Services and Computer Sciences Corporation, have been selected to proceed to Phase 2 of RCAS. In November, 1988, AWIPS contracts were awarded to Computer Sciences Corporation and Planning Research Corporation. The follow-on RFP was released in October, 1990.

As illustrated in Exhibit IV-2, there is a continuing strong need for mainframe computers (by more than two-thirds of the programs being reported on); nearly half the programs reported on include requirements for midsize computers and about seven-eighths of the programs include requirements for microcomputers. As one would expect, complex SI projects frequently utilize a combination of equipment types to solve a variety of user requirements. The number of microprocessors—consisting of PCs and specialized workstations—applies only to planned major systems. The number of microprocessors to be acquired for a range of smaller applications may be considerably higher, by as much as one or two orders of magnitude.

In the commercial SI market, companies with systems integration projects for the most part have a low level of detail in their specifications. As a rule, less time is spent on functionality issues as opposed to performance. This situation is dissimilar to the situation in the federal government market, which by regulations is restrained to functional descriptions of hardware requirements. Not only are these restrictions intended to safeguard against a monopoly of the federal market by any hardware vendor, but it allows systems integration firms to propose more-creative solutions. In the absence of a specification for a particular piece of hardware, the systems integrator in both federal and commercial markets can propose a system that provides the most effective solution.

EXHIBIT IV-2

**Distribution of Type of Target Hardware Systems
for Systems Integration Programs**



Hardware manufacturers have become contractors in the commercial systems integration market in areas where they can apply new technologies, expand markets for those technologies, and leverage existing and new product lines. In effect, manufacturers are focused on utilizing their typically limited professional services resources to maximize the return on core business products. This focus is true in most cases for federal market vendors as well. Most hardware firms prefer to apply their own core business products and cannot avoid the use of the hardware of other manufacturers. This policy may limit hardware companies' ability to respond to all systems integration opportunities.

C

System Applications

The reference documents and the interviews for systems integration programs consulted for this report identified a wide variety of applications. Since this information indicates the current opportunities, it is included here as well. The applications shown in Exhibit IV-3 should be considered representative of systems integration requirements only. A number of the applications may sound like variations on office automation. They represent, however, the impact of two (apparently contradictory) trends:

- The aggregation of corporate data to a level that encompasses all interested users within the span of a single organizational manager
- The separation of unique processing activities down to the end user's offices

Thus, end users throughout a large organization are able to make use of the same data wherever the data is relevant to their activities. However, by exercising control over local processing capabilities, each user is able to process it in ways that are uniquely useful to his or her operating function.

EXHIBIT IV-3

Systems Integration Project Applications

- Project management
- Graphics
- Management
- Accounting
- Logistics
- Office automation
- Administration
- Information analysis
- Science and engineering
- Artificial intelligence
- Human resources

Note: presented in decreasing order of numbers of responses.

Project management is the most frequently mentioned application of systems integration projects. Federal agencies, both defense and civil, want to be able to coordinate and manage large (and visible) projects more effectively and efficiently.

On the Defense side of system applications, logistics and distribution systems are the most prevalent projects, followed by graphics and project management, office automation, artificial intelligence, and management.

On the civil side of system applications, project management and accounting are the most prevalent projects, followed by administrative applications, scientific/engineering applications, management, graphics, and by office automation.

The commercial systems integration market is different from the federal SI market in that it is less granular. The federal agencies tend to acquire systems that are specific to that agency, whereas most firms acquire systems that may be applicable throughout their vertical industry.

Another difference between the markets is that office systems programs are larger and more extensive in the federal sector. Federal agencies have a greater need to update and integrate multiple levels and types of equipment. Many federal office projects include networks to interconnect widely dispersed offices and branches.

The federal agencies are also replacing more finance and administrative systems than in the commercial sector. In response to the Administration's Reform 88 program, a single federal financial system is required to be implemented by 1992. Major replacements are scheduled for defense and civil agency payroll systems and operations systems. Most of these replacements will be conducted in an SI environment.

D

Case Studies of Systems Integration Contracts

In this section, case studies of systems integration projects that were awarded at least one year ago are presented. The data was collected from prime contractor project managers. The case studies illustrate how contractors attempt to manage complex systems needs by providing equipment, software, professional services, and operations and maintenance functions. Summary contract data is also shown to depict how different project requirements can affect contract types.

FEDERAL SYSTEMS INTEGRATION PROJECT CASE STUDY

Program Name: Repair Facilities Automation

Department: Department of Defense

Branch: Contractor requested that the client not be specifically identified.

Mission Problem/Function: Automate the repair facilities on the shop floors at Department of Defense Centers. It will help control the repair function while decreasing the cost of repairs.

Major Tasks Performed

- Designed new methods and procedures
- Designed an automated system
- Provided hardware and software

Contract Information

Type	Amount	Duration
Fixed price	\$113 million	12 years (including maintenance)

Schedule

RFP Release	Bid due date	Award	Completion
8/86	11/86	6/87	1993

Contractor(s)

	Company	Function
Prime Contractor	GDS	Design/Integration/Management
Subcontractor	IBM	Hardware Platforms
Subcontractor	Cincom	DBMS and Applied Software
Subcontractor	Ernst & Young	Applications Software

Project Components:**Equipment:** \$35 million

Contractor supplied: IBM 3090 (7), IBM 4381 (2), IBM peripherals

Software Products: \$10 million

- Systems software
IBM MVS; Cincom Supra
- Applications software
Manufacturers Requirements Planning II (Cincom), modified by Cincom and GDS

Professional Services: \$50 million

	P-Prime Contractor, S-Subcontractor, O-Other
Design/Integration	P
Project Management	P
Education/Training	S

Software Development:

Manufacturers Requirements Planning II
Financial Reporting
Interfacing Software

Operations and Maintenance: \$15 million

The prime contractor provides maintenance management, and the subcontractors provide specific maintenance functions.

Other Products and Information Services: \$3 million

Product Content Software

Project Status

The initial operating capability has been installed at the first site. The initial operating capability is currently being installed at other sites. This represents Phase I of four phases. The client is very satisfied with the vendor's progress, and the project is going very well.

GDS expects to have a fully operational system at one site by mid-1991. It then plans to migrate the fully operational system to other sites by mid-1992. Unique applications for all sites are being developed simultaneously.

FEDERAL SYSTEMS INTEGRATION PROJECT CASE STUDY

Program Name: **Engineering Research and Technical Support**
Department: **Transportation**
Branch: **National Highway Traffic Safety Administration**

Mission Problem/Function: Integration of hardware, software, office automation, and networking for greater efficiency and cost savings.

Major Tasks Performed

- Design and support an integrated computer center
- Design and support an agencywide Ethernet network
- Design and support an agencywide management information system
- Provide agencywide office automation support

Contract Information

Type	Amount	Duration
Cost plus fixed fee	\$20 million	5 years

Schedule

RFP Release	Bid due date	Award	Completion
NA	NA	8/1/86	7/31/91

Contractor(s)

	Company	Function
Prime Contractor	Automated Sciences Group	Consulting Services, Design/Integration, Project Management, Education/Training
Subcontractor	ISSI	Programming Support
Subcontractor	UVA	Engineering Analysis
Subcontractor	Kelley Associates	Special Study
Subcontractor	Canfield-Cook	Report Writing, Analysis
Subcontractor	Metro Media	Software Development

Project Components: **Equipment:** \$3 million

Agency Supplied: Wang VS/100 (6); IBM-compatible PCs (65); VAX Cluster; AT&T 3B2 Cluster; HP 9000/840

Software Products: \$2 million

- Systems Software
VMS, UNIX, DOS
- Applications Software
Fortran, C, Ingres, Oracle, Informix, dBase

Professional Services: \$15 million

	P-Prime Contractor, S-Subcontractor, O-Other
Consulting Services	P
Design/Integration	P,S
Project Management	P
Education/Training	P,S,O

Software Development:

Off-the-shelf applications were supplied by the prime contractor. Custom-developed software was developed by the prime contractor, ISSI, and Metro Media.

Operations and Maintenance: \$7.5 million

The prime contractor provides operations and maintenance support.

Project Status

The contract is in its last option year. The contract has evolved into a task order contract although it was not one originally. The client is extremely happy with the progress.

FEDERAL SYSTEMS INTEGRATION PROJECT CASE STUDY

Program Name: **Cargo Movement Operations Systems (CMOS)**

Department: **Department of Defense**

Branch: **U.S. Air Force**

**Mission Problem/
Function:**

The Air Force tracks and moves cargo throughout the world. The cargo's condition and status as it moves through transportation channels is basically a manual process today. The Cargo Movement Operations System (CMOS) will provide automated support to the cargo movement environment and allow for more-efficient handling and tracking, thus allowing for the movement of increased volumes of cargo.

**Major Tasks
Performed**

- Modified systems specifications
- Developing and implementing the entire system, including the integration of all hardware, software, and data communications.

Contract Information

Type	Amount	Duration
Firm Fixed Price	\$11,958,369.95	3 years

Schedule

RFP Release	Best and Final Offer	Award	Completion
NA	4/5/89	5/26/89	6/1/92

Contractor(s)

	Company	Function
Prime Contractor Subcontractor Subcontractor	ERC International Wollongong Group CACI	Project Management, Modification, Integration Data Communications Transportation Analysis

Project Components:**Equipment:** \$300,000

Vendor Supplied: Sun 386i workstations

Agency Supplied: AT&T 3B2-600G, Zenith Z-248s

Software Products: \$8,000 per site

- Systems Software
UNIX System V/MS-DOS
- Applications Software
DDN/FTP, DDN/GMTP, DDN/Telnet, DESQVIECO Windows,
Prelude E-mail, Oracle RDBMS

Professional Services: \$11 million

All services were provided by the prime contractor.

Software Development:

CMOS Increments I and II were custom developed by ERC International.

Operations and Maintenance: \$2,080,000

ERC International provides operations and maintenance support.

Project Status

There are three increments. Increment I has cancelled System Design Review. Increment II has just begun System Requirements Analysis and Increment III has been initiated. \$6.2 million was originally appropriated for this contract, but the scope of the project will in the future change from the original specifications. The project has been very successful to date.

FEDERAL SYSTEMS INTEGRATION PROJECT CASE STUDY

Program Name: **Inspector General Network (IGNET)**

Department: **Department of the Army**

Branch: **Inspector General**

**Mission Problem/
Function:**

Conversion from a manual data collection, processing, and storage operation to a fully automated system, to include worldwide data communications among 140 Army Inspector General offices.

**Major Tasks
Performed**

- Design and develop integrated hardware and software capabilities to meet specified requirements
- Work includes local and worldwide networking, encryption, training, maintenance, and system engineering support.

Contract Information

Type	Amount	Duration
Fixed Price	\$15 million	8 years

Schedule

RFP Release	Bid Due Date	Award	Completion
4/83	8/83	3/84	3/92

Contractor(s)

	Company	Function
Prime Contractor Subcontractor	PRC Convergent Technologies	Equipment and software data base

Project Components:**Equipment:** \$5 million

Contractor supplied: Convergent PHD-010 (140); CP-001 (120); CP-002 (450); SRP (1); PHD 147 (4); Racal-Milgo 1027 (140); Centronics LP 885 (20); AMT Printers Accel 500 (200); Canon laser printers LBP-8 (50).

Software Products: \$600,000

- Systems software: CTOS/VM
- Applications software: Word Processing, mail, DBMS spreadsheet, graphics, cluster network, encryption, computer-based training

Professional Services: \$4 million

	P-Prime Contractor, S-Subcontractor, O-Other
Consulting Services:	P
Design/Integration:	P
Project Management:	P
Education/Training:	P

Software Development:

E-Mail, DBMS, Printer Drivers/Spoolers were supplied off-the-shelf.

Encrypted data transmission software, DDN communications software, user statistics, and computer-based training were custom developed by the prime contractor.

Operations and Maintenance: \$6 million

The prime contractor provides operations and maintenance support.

Other Products and Services: \$2 million

The prime contractor is providing installation, systems engineering support, and user support.

Project Status

The client is extremely satisfied with delivery and performance on this contract. All 140 sites were installed as of October 1, 1989. Additional equipment is being installed as funding permits. Worldwide communications architecture is being redesigned to increase efficiencies and reduce overall communications costs.

Systems Integration Programs

Dept	Acronym	Program	Contractor	Yr
Air Force	AFC2S	Air Force Command & Control System	GTE	89
	AFEMS	Equipment Maintenance System Marietta	Martin	89
	AFWAM	WWMCCS ADP Modernization	Honeywell	89
	C2IPS	Command & Control Information Processing System	CSC	89
	DMMIS	Depot Maintenance Management Information System	Grumman	88
	HSRP	HQ Systems Replacement Program	Grumman	88
	SC&D	Stock Control & Distribution	CSC	87
	SWPS	Strategic War Planning System Dynamics	General	89
Army	ASIMS	Previously VIABL	EDS	81
	CEAP-1A	Corp of Engineers Automation Project	CDC	89
	CHCS	Composite Health Care System	SAIC	88
	FIS	FORSCOM Information System	Boeing	88
	TMIS	Technical Management Information System	CSC	87
Defense	DMSSCI	Defense Medical Systems Support Center Integration	EDS	90
DLA	DLSCDIDS	Defense Logistics Service Center/Defense Integrated Data System	Grumman	90
NASA	EADS	Engineering Analysis Data System—Marshall	Grumman	85
Navy	EDMICS	Engineering Data Management Information Control System	Advanced Technology	89
	ICP	Inventory Control Points	EDS	84
	SPAR	Stock Points ADP Replacement	EDS	87
SEC	EDGAR	Electronic Data Gathering & Retrieval	BDM	89
Transp	NAS-FAA	National Airspace System	IBM	88
Treasury	CDN	Consolidated Data Network	CSC	85

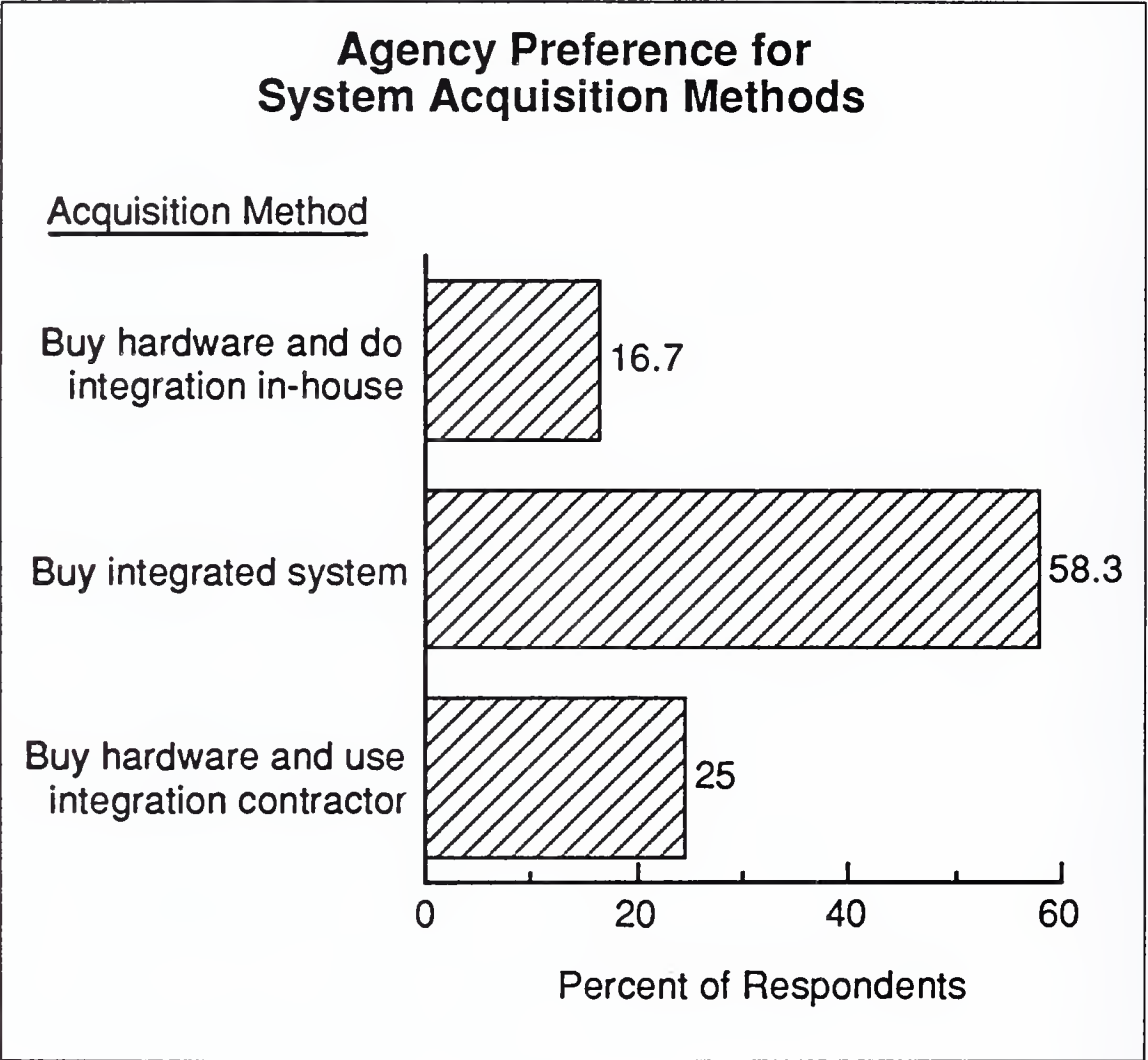
Dept	Acronym	Program	Contractor	Yr
VA	IDCU	Integrated Data Communications Utility	SAIC	88
	IHIS-Chi	Integrated Hospital Information System—Chicago	SAIC	90
	IHIS-NY	Integrated Hospital Information System—Brooklyn	SAIC	90

E

Acquisition Plans and Preferences

Agencies interviewed in the study were asked to comment on their perceptions of how integration programs are now acquired and how agencies would prefer to acquire programs in the future. Last year, half of the agency personnel interviewed preferred separate acquisition of the system components and performance of integration in-house. This year, more than half of agency personnel preferred buying an integrated system, as shown in Exhibit IV-4.

EXHIBIT IV-4



The remainder of the respondents favored purchase of the hardware separately, along with the use of an integration contractor, over attempting to do systems integration in-house.

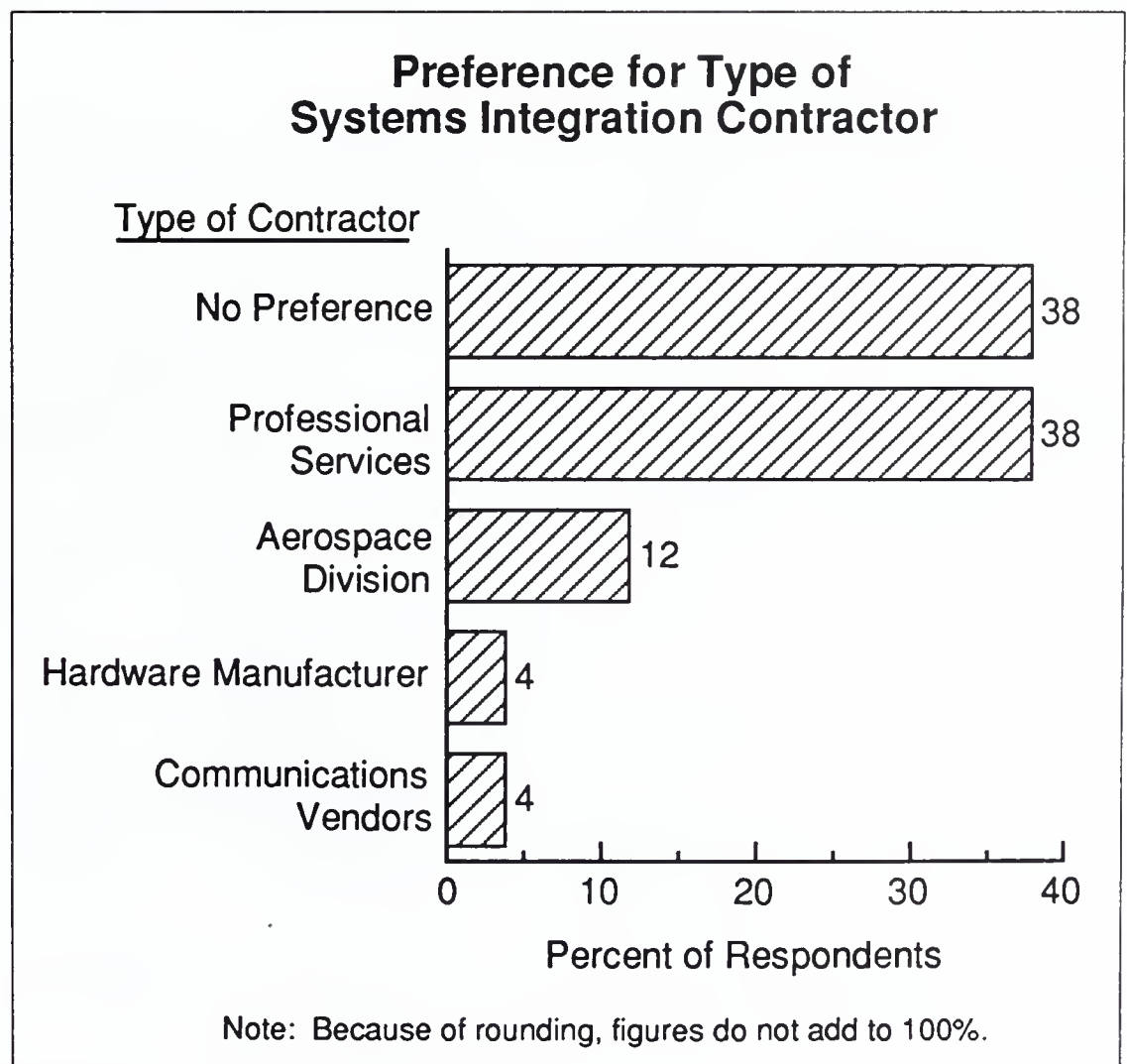
In the commercial sector, decisions concerning the use of internal or external resources were usually based on scope, technical requirements, timeliness, risk factors, and corporate economics. In general, when an outside systems integration company was retained, it was mainly due to the buyer's lack of internal capability and/or resources. There were cases when a complete or partial capability existed within the buyer's organization, but due to other considerations, such as current workload or not wanting to increase the professional staff, a systems integration vendor was retained.

Agency representatives were also asked to describe the technology levels required to support their SI requirements. As shown in Exhibit IV-2, only 8% of the agency programs included a requirement for supercomputers. However, INPUT has found in other surveys that some agencies are considering using supercomputers for other than scientific applications, such as process control and econometric modeling. Supercomputers will likely continue to have relatively little impact on the federal systems integration market.

At the time of writing this report, considerable controversy existed over the necessity and success of large-scale systems integration projects. As discussed above, GSA was advocating downsizing or a modular approach to developing large-systems projects. Many agencies, as well as vendors, believe that single-point responsibility and liability represent the only procurement avenue to pursue in establishing a multivendor environment. INPUT expects this debate to continue until a few highly visible successes or failures take place.

Agencies that expressed a preference were strongly in favor of using professional service vendors for SI acquisitions, as noted in Exhibit IV-5. This preference represents a significant shift from the results of INPUT's previous studies, and suggests a higher comfort level with this group of vendors.

EXHIBIT IV-5



A number of agencies, including program management respondents and contracting office respondents, interpreted this question in such a way that only a "no preference" response would meet the open-competition requirements of current acquisition regulations. Of the remainder, a clear majority prefer professional services contractors for their systems integration efforts. Agencies with prior SI contract experience felt that the systems vendors made design choices that better supported the agencies' operational needs. Hardware manufacturers and communications vendors were preferred much less frequently than in previous surveys.

Bid selection criteria, while varying among agencies and even among specific projects within each agency, usually involved:

- Proposed technical solution; that is, the extent to which the proposed solution meets the requirements.
- Cost, although this is considered by contracting personnel as a primary criterion only when two or more vendors propose similar approaches or equipment.
- Risk containment procedures, including adequacy of reporting schemes and progress reports.
- The type of contract. As discussed earlier, the contract should be such that agencies have some assurances that cost and/or delivery schedules will not be overrun.

Results of federal agencies' ratings of six selection criteria for systems integration contract awards are shown as Exhibit IV-6.

Technical solution and life cycle cost were ranked numbers one and two last year also. This year, however, project management and contract type changed positions, reflecting increased attention by federal agencies on the need for improved management of SI projects. Risk containment moved down in rank from last year—federal agencies are taking more responsibility to assess risk in SI projects and are focusing more on life cycle costs (and attempting to prevent buy-ins) in accordance with directions from GAO and Congressional oversight committees.

Although risk containment was reduced in relative importance from last year's survey responses, it remains an important consideration in SI services acquisitions. Large federal projects may be expected to exhibit some of the attributes of OMB Circular A-109 acquisitions even if the projects are not conducted within the purview of A-109 regulations. As a consequence, large projects are likely to include checkpoints in the implementation schedule at which the success of the current implementation phase is assessed prior to authorizing a contractor to start work on a succeeding phase.

EXHIBIT IV-6

Selection Criteria Significance for Systems Integration Contract Awards

Rank	Selection Criteria
1	Technical solution
2	Life cycle cost
3	Project management
4	Risk containment
5	Initial cost
6	Contract type

Note: ranked based on average ratings
by agency respondents.

The high ranking of life cycle cost is considered a reaction to the budgetary conflicts encountered on the way to project authorization and funding. Risk containment gains importance under CPFF-type contracts because the government assumes a higher proportion of the risk than under FP contracts.

Despite a frequently stated preference for basing awards on something other than cost, most contracts still seem to be decided that way. Whenever a major contract goes to other than the lowest bidder, the loser usually protests. Often, this protest leads an unhappy congressman to order a GAO investigation. Frequently, the time available for the GAO analysis may be too short or reflect an auditor's tendency to equate lowest overall cost to the best solution.

To avoid this development, many contracting officers engage in technical leveling. If the technical proposals can be brought into a competitive range, then the contracting officer can award to the lowest bidder. This will enable him or her to avoid, in most cases, congressional investigations.

The relative ranking, by vendors, of agencies' systems integration contractor selection criteria appears in Chapter V.

The technical solution was identified as the primary criterion for selection by agencies in this and earlier reports. Life cycle cost was listed as the second-most-important criterion and previously was seldom used in actual contracting practice. In actual practice, however, initial cost was frequently the second-most-important selection. Agency executives ranked risk containment lower than in past surveys, reflecting a growing concern over systems-life costs. Because agencies increasingly face the reality of budget limitations, there is no longer a trend for agencies to pay lip service to total life cycle costs.

Vendors, however, ranked life cycle cost as the least important selection criterion in our study this year. They ranked contract type and initial cost as the most important selection criteria.

INPUT's research showed the bid process in the Commercial Systems Integration marketplace to be quite different from the approach used within the federal government.

1. Participants

Of the commercial buyers polled, 80% determined beforehand which outside systems integration companies would be invited to bid on the project. Vendors were identified by talking to other companies involved in major projects, scanning literature and advertisements, and talking to vendors attending conferences and trade shows. The remaining 20% used an open bidding process and welcomed all outside systems integration companies interested in pursuing the business.

2. Bidder Conferences

Bidder conferences were held in 40% of the cases studied, whereas the remaining 60% scheduled individual meetings with the various vendors. As a result of these conferences or individual meetings, 20% of the companies modified or enhanced their original specifications.

In most cases when the bid was closed, the buyer invested considerable time in prescreening the various vendors' capabilities and expertise. The buyers did register a concern regarding the lack of vendor information that outlined the various systems integration services and capabilities. Given the investment required by buyer and vendor in bidding a systems integration project, prudent management says to involve only vendors that appear to have, at least, adequate capabilities for the specific project.

Somewhat surprisingly, the research findings indicate there was no pattern in determining the chosen vendor. Instead, a combination of approaches was used and in some cases considerable thought was not given to this issue until the vendors bidding the project had submitted their proposals.

The most common approach was the overall evaluation of how the vendor proposal measured up to the buyer specification, but in addition there were numerous other criteria identified as having major significance in the selection process.

3. User Criteria

As listed in Exhibit IV-7, industry experience, applications knowledge and cost/performance criteria were ranked the three most important issues in selecting a systems integration vendor. Alliances, widely reported in the press as being very important, were not ranked by respondents as important. However, this poor ranking could be due to the transparent nature of the alliances' participants from the viewpoint of the buyer organizations.

Buyers' other important criteria included the financial health of the proposed vendor, the expertise and stability of the proposed project management team, a knowledgeable and professional technical staff and, finally, vendors' concern with providing the best solution, as opposed to promoting established products and capabilities.

4. References

The two companies that registered the highest degree of satisfaction concerning the overall success of the project relied heavily upon references and on-site visits to similar installations. Many of the other companies interviewed also used references and on-site visits as a means of establishing vendor capability. When considering the general lack of industry information available, as reported by the buyers from a vendor and project viewpoint, on-site visits and reference checks became a critical means of validating a particular vendor's claims.

EXHIBIT IV-7

Commercial Vendor Selection Criteria

Type	Frequency of Use* (Percent)
Industry Experience	86
Applications Knowledge	86
Cost/Performance	86
SI Experience	79
Project Management Skills	64
Support Skills	64
Service Orientation	50
On-Site Visits	43
References	43
Alliances	21

*Multiple responses permitted.

F**Trends**

Agency representatives were asked by INPUT to rank technical factors that could improve the success of federal SI projects. The factors are ranked in Exhibit IV-8.

In recognition of the growing federal need for very high-level applications that are common across several/many agencies, agencies rank intersystem compatibility and software standardization as the first and second most important factors. It should not be surprising that, this year, agencies ranked factors that affect their ability to perform their missions ahead of technical factors that influence how agencies perform their missions.

The adoption of GOSIP and POSIX as FIPS will stimulate agency needs to integrate new and existing systems.

EXHIBIT IV-8

Technical Factors for Successful Completion of Federal SI Projects

Rank	Technical Factor
1	Intersystem compatibility
2	Software standardization
3	Expanded networks
4	New technologies
5	Distributed processing
6	Increased microcomputer availability
7	Expert systems/artificial intelligence

Ranked in decreasing order of impact.

Agencies were also asked to rank nontechnical factors that might affect successful completion of federal SI projects. The results are shown in Exhibit IV-9. Last year, more than half of the respondents identified budgetary limitations as the largest single obstacle. Limitations in funding also contribute to the lack of available skilled staff within the agencies and the agencies' difficulty in retaining them.

EXHIBIT IV-9

Nontechnical Factors for Successful Federal SI Projects

Rank	Nontechnical Factor
1	Availability of skilled staff
2	Internal agreement on requirements
3	Effort associated with acquisition
4	Budgetary limitations
5	Regulations imposed on agency
6	Increased Congressional oversight
7	Industry consolidations/mergers

Ranked in decreasing order of impact.

This year, however, availability of skilled staff is the most important factor for success in federal SI projects. Next most important is management of the effort, as shown in the second- and third-ranked factors. This year, budgetary limitations and other factors were judged less important than staff and management.

Agency respondents were queried on their suggestions for how vendors might make their systems integration services more valuable to the federal government over the next five years. As should be expected, the replies varied due to the different types and levels of experience the respondents encountered with vendors. In descending order of frequency of mention, Exhibit IV-10 lists the principal suggestions made by the agencies.

EXHIBIT IV-10

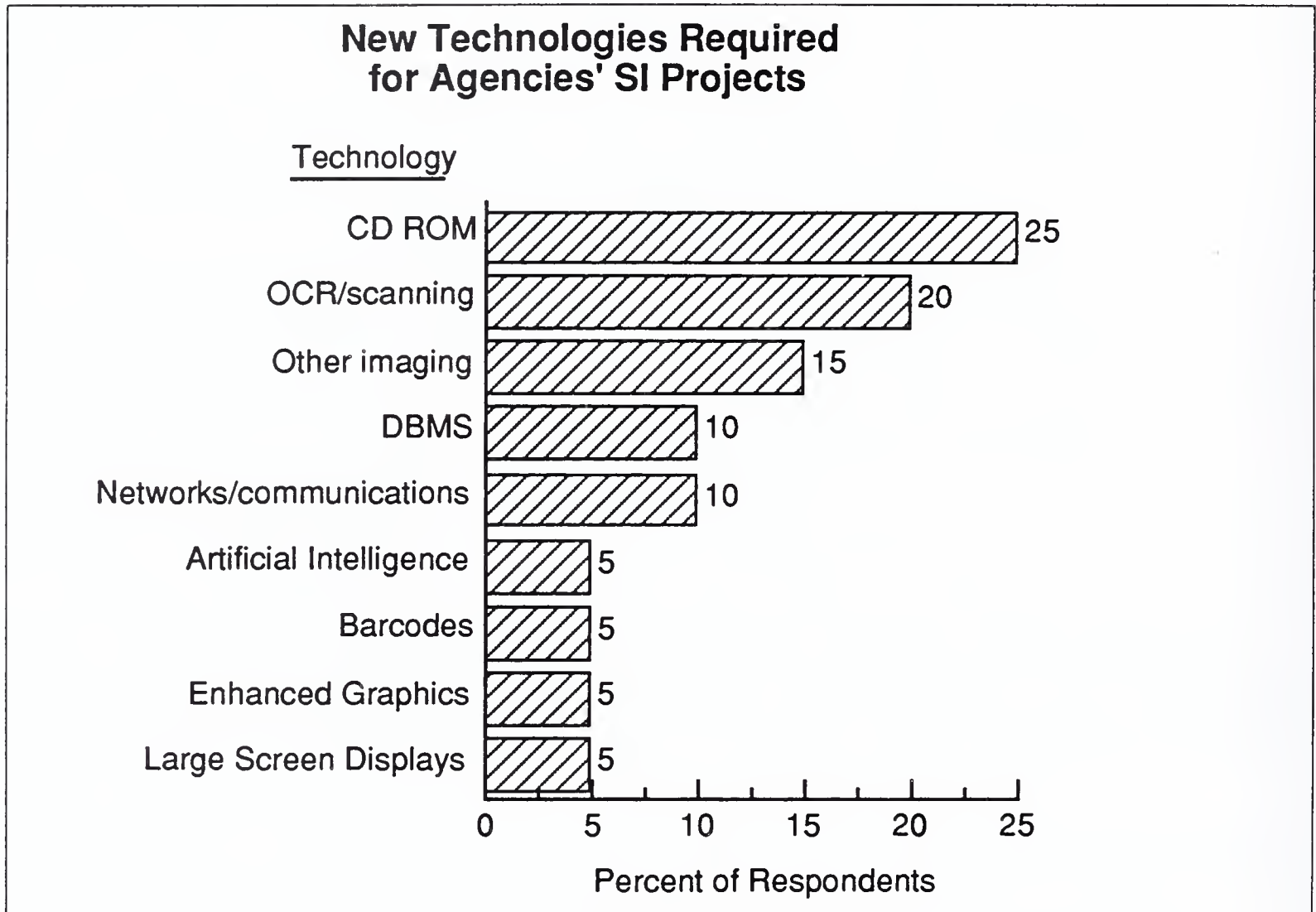
Agency Suggestions for Improvements to Vendor Services

Rank	Suggestion
1	Understand project issue/task/agencies' way of doing business
2	Improve communication with agency
2	Reduce system life cycle and maintenance costs
2	Adopt government standards
3	Use more-capable/experienced staff
3	Deliver on time
3	Improve program management
3	Improve testing prior to software release
3	Improve ease of transition to new system
3	Know your own market and compatibility
3	Remain flexible; agencies' budgets do change
3	Improve use of automated tools

All suggestions reflect how extensively agencies rely on outside contractors. Improved understanding of agencies' requirements and operating environment was most frequently desired. Improved communication with the contracting agency, as well as reduced costs and increased adherence to federal information systems standards, were the next most frequently stated suggestions. The primary reason agencies seek the services of systems integrators is for integrators' special professional skills. Agencies do not have the necessary technical expertise to design, implement, and coordinate the complex hardware and software systems that are demanded to fulfill governmentwide federal IRM needs. Contractors must continually be in search of trained and experienced personnel to keep up with advancing technology. To be successful as systems integrators, contractors must closely learn the culture of an agency and anticipate hidden agendas. By supplying compatible software systems, contractors will take steps closer to ensuring interoperability, connectivity, and upgradability between systems.

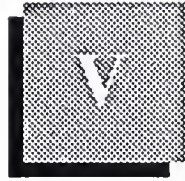
As a result of this year's agency survey, INPUT finds a growing need for, and plans to incorporate, new technologies in agencies' mission-essential application systems. As shown in Exhibit IV-11, agencies plan to incorporate CD ROM, OCR/scanning, and other imaging technologies into their systems.

EXHIBIT IV-11



Consistent with Exhibit IV-11, CD ROM is one of the most attractive new technologies available; it offers high-density mass storage of static data and low-cost publishing technology. For static data that must be centrally maintained but distributed widely, a five-inch CD ROM disk holding 500-600 megabytes can be produced for less than two dollars (in large enough quantities) and mailed for one-ounce first class postage. No paper product can provide similar benefits for the same costs.

In general, INPUT's findings suggest significant and growing opportunities in the federal government. Agencies' SI services needs will increase as productivity pressures grow and agency resources become further constrained.



Systems Integration Vendors

A

Overview

The federal systems integration market will continue to grow through 1995. Although there are some doubts about “grand design” systems integration projects, the government will still rely on this method to bring solutions to data processing and sharing problems. Some vendors will take greater advantage of this market growth than other vendors.

There is an increasing trend for vendors to serve a wider range of federal agencies. Further, many SI vendors that had not previously targeted the commercial SI market are now doing so. They wish to broaden their business base to hedge their bets on the federal SI market, and also leverage their federal experience.

Vendors are attracted to the federal SI market by its growth potential and related benefits. Most vendors will try to win major SI contracts, but many others will work toward competitive niche jobs. However, for most of these vendors, SI is only one component of their federal strategies. Unfortunately, most vendors now refer to themselves as systems integrators, even when use of the term does not mean they could serve as prime contractors.

Federal SI vendors offer most of the products and services involved in SI bids as prime contractors and subcontract others. The products and support services most frequently subcontracted to other vendors include:

- Hardware/equipment
- Software development
- Operation and maintenance services
- Education, training and documentation
- Network management and installation

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B**Market Share****1. Top Systems Integrators**

INPUT estimated the ranking of the ten leading SI vendors, based on government systems integration expenditures, as in Exhibit V-1.

EXHIBIT V-1

**Top Ten SI Vendors in the Federal ADP Market
CY 1989**

Rank	Vendor
1	IBM
2	Electronic Data Systems
3	Science Applications International Corp.
4	Martin Marietta
5	Computer Sciences Corporation
6	Unisys
7	Boeing Computer Services
8	Grumman Data Systems
9	PRC/Emhart (Division of Black & Decker)
10	Control Data Corporation

These companies are under contract to meld different hardware, software, and services with standards and processes into large complex systems. Except for IBM, Unisys, and Control Data Corporation, none of the top SI contractors were hardware vendors. Complex systems often require multivendor solutions. Hardware manufacturers have traditionally adhered to provision of their own proprietary systems solutions and offered to manage multivendor projects. However, most hardware vendors have changed their policy to allow multivendor solutions. IBM is an example of a hardware vendor that has effectively managed multivendor solutions.

2. Corporate Profiles of Top Federal Systems Integrators

The following are brief corporate profiles of the top ten SI contractors (ranked according to federal SI revenue):

a. IBM Corporation

IBM is the world's premier developer, manufacturer, and marketer of computer equipment. IBM's organization and management system has always been focused on retaining this fundamental purpose.

The executives who direct IBM have a strong heritage of marketing or developing computer equipment. The current leaders include: Chairman John Akers, who spent most of his IBM career in marketing, and President Jack Kuehler, who spent much of his career in equipment development and manufacturing. Their bias has affected the corporation's interest in and commitment to the information services industry. Also, IBM's business focus is on leveraging equipment sales, not on service revenue from individual projects.

IBM's earliest activities in the systems integration market were performed by a group that is now called the Federal Sector Division. This organization was chartered more than thirty years ago by IBM's founder, Tom Watson, who made a commitment to the nation and its welfare and defense. Some examples of this division's early projects are:

- Project SAGE (Semi-Automatic Ground Environment)—a nationwide air defense system
- The current FAA Air Traffic Control System

More currently, IBM has been involved in the new FAA Air Traffic Control System, the command and control system for the BSY-1 submarine, and the integration of the LAMPS antisubmarine helicopter.

Recognizing systems integration as an important distribution channel, the management of the (then) Federal Systems Division obtained corporate permission to first test its skills in the commercial SI market, and later to make a major commercial SI thrust. Renamed the Systems Integration Division (SID) and supplemented with commercial professional services talent, it aggressively pursued commercial opportunities during 1987 and 1988. SID was successful in most of these projects, but experienced some difficulties with its commercial marketing organization and customer set.

As a result of changes in the structure of world markets, more customers began to seek solutions rather than products. This offered new opportunities for SI, but with IBM's limited professional services resources and huge customer base it was apparent that internally supplied SI would not satisfy all customer demands.

In 1988, IBM established the Applications Solutions Line of Business (ASLoB) to address the demand for solutions. Recognizing that the product organizations had always dominated the setting of product directions, IBM management attempted to establish ASLoB as an equal partner and important input into the total product planning process. IBM located ASLoB in the U.S. Marketing and Services organization and gave ASLoB responsibility for collecting and addressing worldwide solution requirements.

ASLoB evolved into five major vertical-industry-focused divisions; in 1990 the function of the SID was absorbed into these divisions. Responsibility for federal SI efforts was placed in the Federal Sector division, as was all marketing to the federal government.

IBM's largest federal SI project to date remains the \$3.6 billion FAA Air Traffic Control system modernization.

IBM has not been prominent in SI competitions for the last two years; however, with its economic strength, its wide range of products, its technical capabilities, and alliances with outside professional services firms, IBM can be expected to compete for SI (as for other) requirements whenever and wherever it has the required capabilities and the internal resources needed to compete. Further, IBM participates as a subcontractor on practically every major federal SI procurement.

IBM's 1989 federal SI revenue was approximately \$500 million; its commercial SI revenue for the same period was approximately \$430 million.

b. Electronic Data Systems (EDS)

EDS was founded in 1962 by Ross Perot and in 1984 was acquired by General Motors. It has a strong set of capabilities and resources. Its operational data processing experience, including developing large and small data centers, makes it very successful in the efficient and cost-effective use of technology. Its alliance with GM Hughes provides EDS with aerospace industry knowledge. Having GM as a backer provides EDS with huge financial resources to support bids on the largest opportunities. EDS has 56,000 employees worldwide.

EDS is expanding its commercial manufacturing base beyond its parent company in several ways:

- EDS provided funding to ASK Computer Systems for ASK's acquisition of Ingres Corporation. This acquisition will give EDS access to ASK's manufacturing software and Ingres' data base and software development tools.

- EDS has acquired equity in several companies that increases its business base and its access to technology; included are System One, Westwood, Thomas, and Infocel.
- EDS and Hitachi combined to acquire National Advanced Systems, which was then renamed Hitachi Data Systems (HDS). EDS obtained a 20% equity in HDS.

Recent awards to EDS include the following:

- (October 1989) A contract with INS (\$3.25 million) for facilities management services
- (December 1989) A contract with DSSW (\$5.24 million) to supply ADP technical support services
- (January 1990) A contract with Agriculture's Stabilization and Conservation Service (SCS) (\$12.4 million) to operate and maintain the Cotton Inventory Management System for SCS
- (July 1990) A contract with the Army (\$116.25 million) to provide technical support services to Army ISSC
- (July 1990) A contract with the Army (\$715.9 million) for small multi-user computers. EDS will supply microcomputers, peripherals, operating software, maintenance, training, engineering services, and LANs that operate in conformity with GOSIP. Under the contract, Army, Navy, and DLA can acquire hardware, software, and services to satisfy requirements for different programs.

EDS' 1989 federal SI revenue was \$370 million; its commercial SI revenue was \$175 million.

c. Science Applications International Corporation (SAIC)

SAIC was founded in 1969 by a group of research scientists. It is now an employee-owned-and-operated company of about 9,000 people. SAIC is known as a leader in technology and in research and development. SAIC offers diversified research and engineering services as its primary product.

SAIC is organized into eight operating sectors:

- The Advanced Technology & Analysis Sector
- The Aerospace & Defense Sector
- The Communications, Information, & Space Sector
- The Science & Engineering Sector
- The Space Energy & Environment Sector
- The Systems Technology & Integration Sector

- The Systems, Software, & Telecommunications Sector
- The Technology, Policy, & Operations Sector

SAIC's 1989 federal SI revenue was \$330 million; its commercial SI revenue for the same period was \$25 million. SAIC's total 1989 revenue was about \$865 million; SAIC has approximately \$3 billion in backorders.

d. Martin Marietta

The Martin Marietta Data Systems company was formed in 1970. The Data Systems company was part of the Martin Marietta Information Systems Group. The Martin Marietta Information Systems Group is now divided into seven distinct business areas:

- Information and Communications Systems designs, develops, produces, and operates systems that use advanced hardware and man/machine interface technologies for defense and nondefense purposes.
- Simulation Systems designs, develops, and installs large-scale distributed simulation and modelling systems—for example, the National Test Bed (a nationwide state-of-the-art computer simulation system for test and evaluation of strategic defense concepts, architectures, battle management, and technology applications).
- Civil Information Systems designs, develops, and integrates multifunction administrative and operational large-scale systems for federal, state, local, and foreign governments. Also, three data centers provide electronic data interchange and remote computing services to government and industry.
- Air Traffic Systems designs, integrates, and implements civilian and military air traffic control systems; it also provides airport management services.
- Facilities Management & Professional Services provides customer-site facilities and program management, including systems development, installation, implementation, operations, and maintenance. Also, it provides technical professionals for specialized client requirements, on a task-order basis.
- Internal Information Systems provides applications systems, computer resources, and communications systems to the corporation and its operating companies.

Recent awards to Martin Marietta include:

- (March 1989) A contract with DOE, Western Area Power Administration (\$4.9 million) to provide ADP support services.
- (September 1989) A contract with National Agriculture Statistics Service (\$35.9 million) to provide a nationwide teleprocessing network that ensures the security of sensitive data.

Martin Marietta's 1989 federal SI revenue was \$330 million; its commercial SI revenue for the same period was approximately \$7 million.

e. Computer Sciences Corporation (CSC)

CSC has been active in the federal systems integration arena for over 30 years and is a major software developer and systems integrator. CSC manufactures no equipment, but instead designs, develops, integrates, and operates systems for a broad range of government needs.

CSC's federal government revenue was \$993 million in GFY 1990, up 11% from the preceding year. CSC's federal government revenue was 66% of total operating revenue, down from 73% in the preceding year. The decrease reflects rapid growth in CSC's commercial and international activities, rather than diminished federal demand for CSC's services.

CSC provides services to the federal government primarily through its Systems Group; it is organized as five operating divisions:

- The System Sciences Division provides support to NASA and FAA, as well as offers basic technology services.
- The Applied Technology Division offers facilities management, range operations and maintenance, and information sciences services.
- The Integrated Systems Division provides total turnkey systems engineering and software system support for major government systems.
- The Network Systems Division specializes in implementing wide-area data communications networks and remote data telemetry systems.
- The Special Projects Division provides broad-based systems engineering and technical assistance (SETA) services to clients. Specific emphasis is on communications and software support.

Recent awards include the following:

- (early 1990) A contract with NASA (\$65.7 million) to provide engineering support services to the Wallops Island facility. CSC will support sounding rocket, balloon, and aeronautical programs, and launch range projects
- (August 1990) A contract with GSA (\$48 million) to provide system development and software support services for scientific and engineering applications in GSA's Pacific Zone
- (September 1990) A contract with the Treasury's Financial Management Service (called System 90, worth \$48 million to \$90 million) for professional services and telecommunications equipment to link the Financial Management Service headquarters and the seven Regional Financial Centers. (At this writing, Andersen Consulting has filed a belated protest of the System 90 award; Andersen charges that CSC priced its proposal so low that CSC cannot possibly meet the requirements of the specification).
- (September 1990) A contract with EPA (\$54 million, up to \$347 million with additional options) for Technical and Operating Support Services (TOSS). CSC won TOSS away from Unisys.
- (September 1990) A contract with Army TRADOC (\$65.2 million)

CSC, along with Boeing Computer Services, was also selected to participate in Phase One of the Army RCAS system.

CSC has hundreds of contracts throughout the federal government. CSC expects continued growth in its federal government services market, having identified more than \$14 billion in requirements that match its capabilities and are slated for award over the next three years.

f. Unisys

Unisys is the company formed by the combination of the Sperry Corporation and the Burroughs Corporation. The company manufactures and sells a wide range of systems, from high-performance mainframes to microcomputer-based systems. Unisys can exploit the varied capabilities offered by its two merger partners, especially from the former System Development Corporation (a subsidiary of the former Burroughs Corporation).

The year 1989 was very difficult for Unisys: the company reported a loss of \$639 million and cut more than 8,000 jobs, down to 78,000. Part of the loss resulted from a \$231 million debt restructuring in October 1989. In July, 1990, however, Unisys still reported a \$45.1 million loss in the year's first half after paying preferred stock dividends. In the autumn 1990 bear market, Unisys' common stock price fell below \$3 per share.

Unisys gains approximately 22% of its revenue from Defense contracts. Much of this revenue, however, does not fall within the area of systems integration, since Unisys performs a great deal of work oriented toward weapons systems.

Recent awards to Unisys include a June 1990 contract with NASA (\$20 million over five years) for business, administrative, and management information support services. Unisys will provide application software development, software maintenance, end-user support, technical support, computer operations, and hardware maintenance.

Unisys has moved to open systems and is pursuing expertise in particular businesses and providing specialized software. Unisys is committed to implementing an open UNIX and CASE/4GL environment.

In late 1989, Unisys announced an array of new LINC and MAPPER CASE/4GL products. Unisys also intends to work with other CASE suppliers worldwide to interface their CASE tools with Unisys' LINC application development system. In 1990, Unisys introduced several new product sets that demonstrated a commitment to open systems.

g. Boeing Computer Services (BCS)

BCS is one operating division of seven in the Boeing Corporation fold. The Boeing Corporation was founded in Seattle in 1916 and is now a diversified aerospace company with 153,000 employees. BCS was founded in May 1970 and has 2,700 employees. Most BCS workers provide dedicated support to the parent company. BCS' major role is to integrate large-scale complex information and telecommunications systems. It provides remote computing (including supercomputing), network services, distributed processing services, systems operation services, consulting services, education and training services, and packaged software products. BCS also provides other Boeing divisions with computing and telecommunications support. BCS' total revenue for fiscal 1988 reached \$1.2 billion. About 90% of the total noncaptive revenue for BCS derives from the federal government.

BCS is a subcontractor to AT&T for Network A of FTS-2000. It is providing management systems for the largest procurement in telecommunications history, and is the prime contractor on several government contracts, including the IRS Budget Preparation System and the Inventory Control and Distribution System. BCS also has a contract with the

U.S. Army Forces Command to design and install an automated management information system. One of BCS' largest federal contracts is the NASA Technical Management Information System (TMIS). Under this contract, BCS is providing systems integration services for the Space Station Freedom program. Boeing, along with CSC, was also selected to participate in Phase One of the Army RCAS system.

Boeing Computer Services' 1989 federal SI revenue was \$200 million; its commercial SI revenue for the same period was \$25 million.

h. Grumman Data Systems (GDS)

GDS specializes in providing SI services to a variety of civil and defense federal agencies. GDS has considerable experience in software and hardware engineering, computer graphics, networking, supercomputers, high-level systems architecture, and machine intelligence and correlation.

Grumman's information and other services segment includes the data systems operation, space station program support, and refurbishment and launch preparation of the space shuttle. It also includes service and maintenance of flight simulators and trainers and the support of Grumman aircraft.

Recent awards include:

- (December 1989) A contract with the Defense Logistics Agency (\$60.7 million) to provide a modernized system (the Defense Integrated Data System, DIDS) and to support all logistics functions through collection, processing, storage, and dissemination of data
- (April 1990) A contract with the Office of Naval Research (\$40.9 million) to install a Class VII supercomputer at the Naval Oceanographic Office in Mississippi. This contract includes an option to install another Class VII supercomputer at the Fleet Numerical Oceanographic Center at Monterey, CA

GDS had \$350 million gross sales in 1989.

Grumman Data Systems' 1989 federal SI revenue was \$187 million; its commercial SI revenue in 1989 was \$33 million.

i. Planning Research Corporation (PRC/Black and Decker)

PRC was founded in 1954, and is headquartered in McLean, VA. It has nearly 7000 employees and is a leading professional services company. PRC was acquired in December 1986 by Emhart for approximately \$220 million. Emhart also acquired Advanced Technology, Inc. (ATI), one

year later. In April 1989 Emhart allowed itself to be acquired by Black & Decker Corporation, which announced soon thereafter that it would attempt to sell PRC and ATI. At this time, Black and Decker is merging PRC and ATI into PRC Incorporated. This merger will be complete in January, 1991.

PRC has three main operating groups:

- The Government Information Systems group is oriented toward designing and integrating systems for the U.S. government.
- The Business Information Systems group provides nationwide computer-based multiple-listing services (MLS), computerized systems for group practice physicians, and computer-aided dispatch systems.

PRC's total 1988 revenue reached \$483.6 million, an 11% increase over the previous year's revenue. Approximately 70% of PRC's total 1988 revenue came from government contracts. PRC's 1989 federal SI revenue was \$146 million; commercial SI revenue was \$48 million for the same period.

j. Control Data Corporation (CDC)

Control Data Corporation, founded in 1957 and headquartered in Minneapolis, is best known for its computer hardware but also provides hardware maintenance, systems integration, and systems operations services—as well as operating systems software for business, scientific, and engineering applications to clients worldwide. Once known almost entirely for its hardware, now the company's computer-based services and systems integration businesses will account for over 60% of revenues. In 1989 CDC had revenues of \$2.9 billion, which is a decrease of 19% over the previous year. In 1990, CDC continued to cut its losses by selling off several of its businesses and cutting staffing, but the losses are not over yet.

During the first half of 1990 CDC continued its divestiture through the sales of:

- (January 1990) U.S. and Canadian third-party hardware maintenance business to Bell Atlantic's Sorbus subsidiary
- (March 1990) CDC's remaining (industrial) training operation to a partnership led by a Canadian-based group of human-resource and training companies (Drake International, Inc.) and CDC. CDC retained a minority interest in the company after this sale.
- (June 1990) CDC's Investment Management Information System (IMIS) product, customer base, and related employees to Texas Instruments

- (July 1990) CDC Data Services' Doane Information Services (a provider of software and services to the agriculture industry) to Doane Agricultural Services Company of Cherry Valley, Illinois
- (July 1990) CDC completion of the sale of its Printed Circuits Operation, with 128 employees, to Acsist Associates, Inc.

CDC's big SI win came during October 1989. The Army awarded its Corps of Engineers Automation Plan (CEAP) Phase I-A, worth approximately \$365 million over up to 11 years, to CDC. CDC will provide an integrated worldwide network of CYBER computers.

Over 50% of the CEAP contract revenue will result from systems integration services provided by CDC's Computer Products division.

CDC's 1989 federal SI revenue was \$80 million; its commercial SI revenue was \$150 million.

The following SI services vendors also participate in the federal SI market, although to a smaller degree (in alphabetical order):

k. American Management Systems (AMS), Incorporated

AMS, founded in 1970, provides professional services, application software, and marketing and micrographics services. Since 1982, AMS' marketing has focused primarily on larger financial services firms, federal government agencies, state and local governments, colleges and universities, energy industry clients, and telecommunications companies—as follows:

- Financial services institutions: AMS provides professional services and application software products to money center banks, major regional banks, insurance companies, and other large financial services firms.
- Federal government agencies: AMS provides professional services, facilities management, and processing services to civilian and defense agencies.
- State and local governments, school districts, and universities: AMS provides application software products and professional services to city, county, state, and provincial governments, local school districts, and colleges and universities.
- Energy industry clients: AMS provides software products and professional services to large energy companies and federal and state agencies.

- **Telecommunications firms:** AMS provides professional services and application software products to telephone companies.

In accordance with its business strategy, AMS provides a combination of professional services, AMS productivity tools, and packaged proprietary application software to clients in certain target markets. AMS also attempts to maintain a long-term relationship with its clients.

Major awards to AMS include the following:

- A contract with the EPA (\$21.5 million) for task-order consulting and technical assistance
- A subcontract with IBM (\$11.5 million) to install a billing system for Contel Corp.
- A contract with the Navy Submarine Monitoring, Maintenance and Support Office (\$7.5 million) to upgrade networking applications

80% of AMS' employees are involved in SI activities. AMS' 1989 federal SI revenue was \$18 million; its commercial SI revenue was \$130 million.

I. Andersen Consulting

Andersen Consulting is a separate member firm of The Arthur Andersen Worldwide Organization (The AAWO). Andersen Consulting provides strategic services, integration services (e.g., systems integration and systems management), and change management services. Andersen Consulting employs more than 18,000 professionals worldwide.

Andersen Consulting provides services in systems design and installation, systems integration, systems productivity consulting, information planning, strategic consulting, change management, and systems/network management (outsourcing). This company also offers application software products that support manufacturing resource planning, control, and distribution control/warehouse management, and markets and supports the FOUNDATION computer-aided software engineering (CASE) software product.

Andersen Consulting's 1989 federal SI revenue was \$50 million; for the same period Andersen Consulting's commercial SI revenue was \$510 million.

m. Digital Equipment Corporation (DEC)

Digital Equipment Corporation ("DEC" or "Digital") designs, manufactures, markets, and services general-purpose midrange computers, intelligent workstations, terminals, related peripherals, systems software, and applications software for cross-industry and selected vertical markets.

Without question, DEC holds the leadership position in midrange systems. It has capitalized on its strengths in departmental and distributed computing, enabling it to expand beyond its traditional emphasis on scientific and technical computing to include the general office and administrative applications. DEC operates in virtually all industry sectors; its primary industry markets are: telecommunications, education, federal government, aerospace, automobile manufacturing, banking and finance, health care, and process manufacturing.

As most other SI vendors have done, DEC has formed strategic alliances with British Telecom, Northern Telecom, Ericsson Telephone Company, Philips Telecommunications, and Siemens. These alliances will strengthen DEC's position in the communications component of the SI business.

A recent SI award to DEC was a contract with Boeing Corporation to automate a sheet metal fabrication facility.

DEC's 1989 federal SI revenue was \$45 million; during the same period its commercial SI revenue was \$235 million.

n. The Mitre Corporation

Mitre is a nonprofit company that performs systems engineering, management consulting, and management engineering services. Mitre is often called on when an objective source is needed for a study, or for support services. Mitre does not participate in competitive procurements.

Mitre has contracts with numerous federal agencies, both civil and defense. Examples of Mitre contracts include:

- (November 1989) A contract with DEA (nearly \$500,000) for technology infrastructure assessment and technology base enhancement services
- (December 1989) A contract addition from GSA for \$37.6 million to a contract (July 1989, \$3.4 million) to provide telecommunications management support to FTS-2000

- (June 1990) A contract with IRS (\$750,000) integration support services for Tax Systems Modernization

Mitre had more than \$500 million in total revenue in 1989.

o. Oracle Complex Systems

In June, 1988, Oracle Corporation entered the systems integration business through the formation of a subsidiary, the Oracle Complex Systems Corporation (OCSC). OCSC provides systems integration services to government and commercial clients.

As a systems integrator, OCSC assumes full responsibility for the integration of hardware, software, networks, facilities, and services.

- OCSC is a leading provider of systems integration services in the area of image-processing technology. OCSC has participated in one of the world's largest imaging projects and includes customers in the federal, state, and commercial markets.
- OCSC specializes in providing Oracle-based information management solutions, combined with value-added knowledge and experience in distributed data bases and heterogeneous environments; building/delivering fully integrated image and compound data management systems; and providing high-performance systems using parallel processing and other emerging technologies.

OCSC's 1989 federal SI revenue was \$29 million; during the same period its commercial SI revenue was \$13 million.

p. SHL Systemhouse

SHL Systemhouse, founded in 1974, provides systems integration, professional services, and systems operations services to commercial and government clients. The company also sells microcomputer hardware and software through its ComputerLand Canada subsidiary.

Systemhouse is currently owned (51%) by Kinburn Technology Corporation (KTC), a subsidiary of Kinburn Corporation.

Kinburn Corporation announced, on March 12, 1990, that it could not meet its \$700 million debt. KTC then offered its 51% stake in Systemhouse. BCE Inc. (parent to Northern Telecom and Bell Canada) is considering a bid for Systemhouse.

Systemhouse uses a proprietary methodology (Systems Integration Life Cycle—SILC) to develop and implement all systems integration projects. SILC includes not only the software development life cycle, but also project management, strategic planning, facilities engineering, quality assurance, architecture definition, and capacity planning.

Systemhouse targets federal government and state and local government agencies; it also markets to the banking/financial, medical, insurance, manufacturing, telecommunications, retail, transportation, utilities, and distribution industries.

Recent SI awards to Systemhouse include the following:

- A contract (in joint venture with Ameritech Information Systems) (\$25 million) with the Metropolitan Emergency Communications Agency (MECA) of Marion County, Indiana. The two companies will handle the system design, specification, hardware, software development and testing, vendor bid reviews and recommendations, training, and installation.
- A contract with the Los Angeles Fire Department (\$16 million) for a Fire Command and Control System (FCCS II). This system will link IBM PS/2 workstations at 104 fire stations and Motorola KDT mobile terminals in over 400 trucks into a fault-tolerant system using token ring technology.

Systemhouse's 1989 federal SI revenue was \$69 million; for the same period its commercial SI revenue was \$41 million.

q. Syscon

Syscon Corporation, founded in 1966, provides system development, systems integration, and other systems services. Syscon operated as a public corporation until December 1986, when it was acquired by Harnischfeger Industries for \$92.1 million. Syscon now operates as a wholly owned subsidiary of Harnischfeger Industries. Syscon has 1,800 employees.

Syscon's major business lies in the development of complex systems for the Department of Defense. Syscon provides computer programs used by the military services for training, logistics, business management, and mission-critical systems. Syscon uses Ada to develop software.

Syscon's 1989 federal SI revenue was \$26 million, down from almost \$30 million in 1988; Syscon had no identifiable commercial SI revenue in 1989.

r. TRW

TRW provides high-technology products and services to the space, defense, and automotive information systems markets. Its 1988 revenue totaled approximately \$7 billion; TRW employs about 73,000 people.

TRW has three operating sectors: Space and Defense, Automotive, and Information Systems. The Space and Defense sector provides advanced-technology products, services, and systems management capabilities focused on high-priority national programs. The Automotive sector develops components and systems such as passive restraint systems. The Information Systems sector includes consumer and commercial credit reporting, computer maintenance, real estate information services, and information systems engineering. The Information Systems sector covers the commercial markets for TRW.

TRW's new Systems Integration Group, formed by combining the former Federal Systems Group with two divisions of the Defense Systems Group, provides a wide range of services to the federal government. These services include systems engineering, systems integration, operational and maintenance support, command and control, and information processing.

The Systems Integration Group includes four operating divisions:

- The Systems Division performs systems engineering; it also develops and installs Navy command and control systems and information processing systems.
- The Command Support Division designs, develops, and integrates strategic and tactical command and control systems and security systems.
- The Systems Development Division (in Redondo Beach, CA) integrates and maintains high-technology space and mission support systems.
- The Systems Engineering and Development Division (also in Redondo Beach) designs, develops and integrates command and control systems, information management, battlefield automation, and surveillance and control systems for the Army and Air Force.

TRW has contracts with all three branches of the Defense Department and with several civilian agencies. TRW is known for its expertise in the areas of systems engineering and technical assistance (SETA) and special studies. During GFY 1990, TRW won several major contracts. In early 1990, TRW won a contract with the FAA to provide SETA services in support of the FAA's Advanced Automation Plan; the contract is valued at \$138.9 million.

Other contractors that are visible in both prime and subcontractor roles in the federal SI market include:

- Advanced Technology
- Automated Sciences Group

- Battelle
- BDM
- Booz-Allen
- Centel
- CDSI
- Federal Computer Corporation
- Federal Data Corporation
- Ford Aerospace
- General Dynamics
- GTE
- Harris
- HFSI (a subsidiary of Groupe Bull)
- IBIS
- Intergraph
- ITC
- Litton Computer Services
- Lockheed
- McDonnell Douglas Systems Integration Company
- MCI Communications
- OAO Corporation
- SRA
- SRI International
- Storage Technology
- STX
- Sysorex
- Vanguard Technologies
- Xerox

C

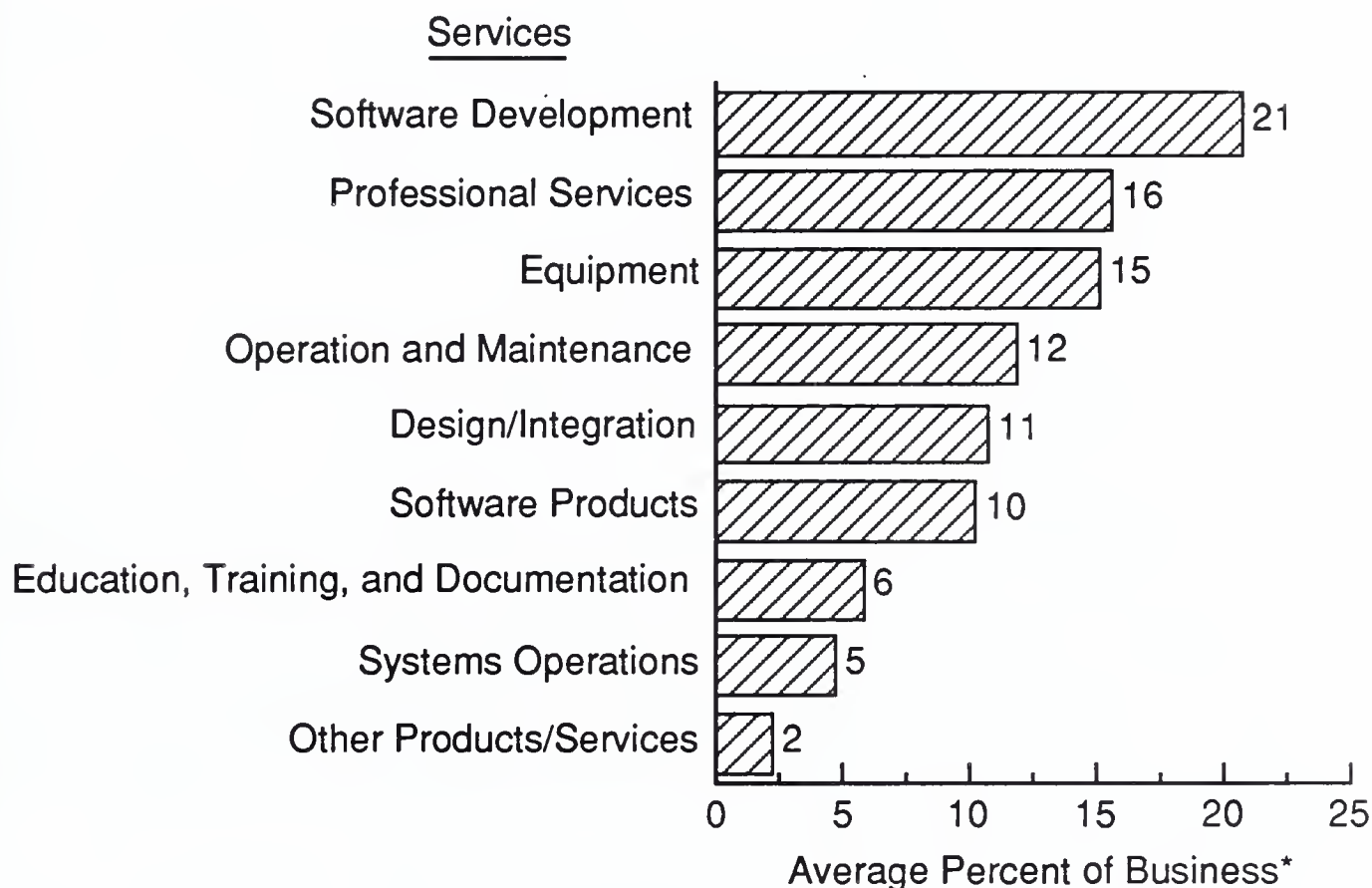
Characteristics of Vendor Respondents

1. The Systems Integration Market

INPUT asked vendor respondents to estimate the percent of their company's federal integration business by specific categories of products and services. Their responses are presented in Exhibit V-2.

EXHIBIT V-2

Federal Systems Integration Business by Service Category



*Percentages do not add to 100% due to averaging.

Software development, (other) professional services, and equipment account for one half of the average SI vendor's revenues. Last year, providing equipment requirements accounted for more than one-third of revenues; it accounts for little more than 15% this year. Although equipment is still a significant part of the SI business, nearly six-sevenths of the revenues now come from other sources.

It should be noted that, last year, respondents expressed difficulty in responding to this question and to a similar question that asked them to select revenue ranges for each category of services and products offered. Also, vendors competing in this market generally do not track their SI revenues by product and service categories. Therefore, there is a large potential for error in the results.

Respondent vendors represented large corporations having average federal SI revenues in excess of \$36 million. This figure represents only federal SI revenues. The average percent of SI work contracted out, by dollar value, was approximately 20%, as shown in Exhibit V-3.

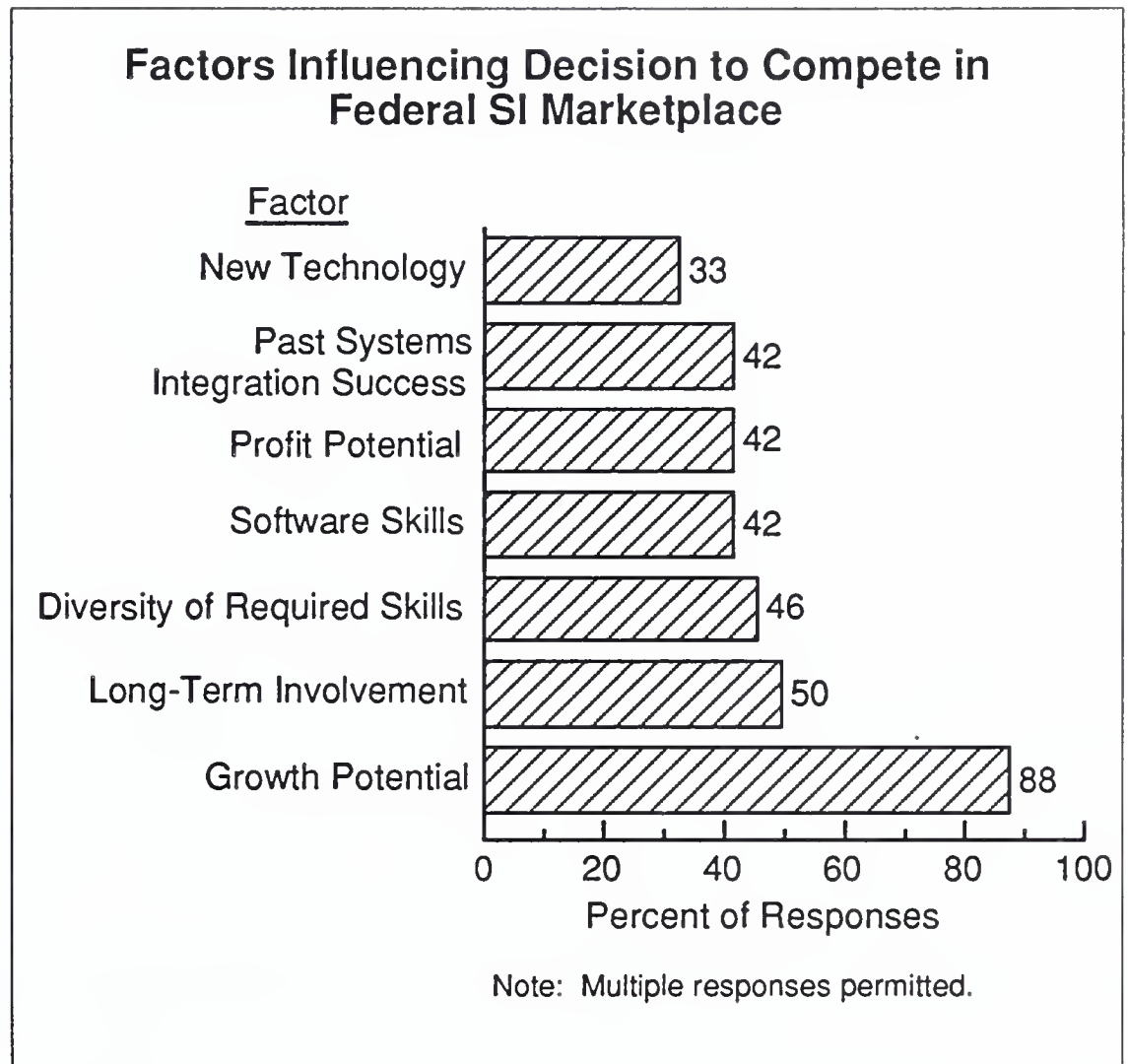
EXHIBIT V-3

Summary Corporate Data of SI Respondents

Average Federal SI Revenue (\$ Millions)	Average Percent of Work Contracted Out
36.1	20

The majority of those interviewed cited anticipated growth of the federal SI market as the primary factor that influenced their company's decision to compete for SI opportunities, as shown in Exhibit V-4. In second place was the opportunity for long-term involvement in a project. The diversity of required skills was the third-most-frequent factor. Three factors were fourth most frequently cited: past SI successes, availability of required software skills, and profit potential. New technology was the least frequently cited factor.

EXHIBIT V-4



2. Procurement Approaches

Vendors competing for federal systems integration market share employ one or more approaches to capturing new business opportunities. Respondents to this year's survey will utilize several different approaches to win SI contracts, but they did state they will primarily pursue competitive niche jobs and IDIQ contracts more than the other procurement approaches, as seen in Exhibit V-5.

EXHIBIT V-5

Vendor Procurement Approaches to Federal Systems Integration

Procurement Approaches	Rank
Competitive Niche Jobs	1
IDIQ Contracts	2
Major SI Opportunities	3
Basic Ordering Agreements	4
Sole-Source Seed Jobs	5

Seeking competitive niche jobs will be the most active procurement approach pursued by vendors, followed by indefinite-delivery/indefinite-quantity (IDIQ) contracts, and only then pursuit of major SI opportunities. The sample of SI vendors appears to possess the technical resources, reputation, and procurement savvy to compete effectively in this highly competitive market. Most vendors cannot afford to focus solely on the SI market at the expense of other market opportunities. Rather, SI forms only one component of an overall federal-market-oriented product and service offering.

In the commercial SI market, the procurement approach is strongly affected by the strategic planning process. Commercial market selection is usually fairly narrow, with one or two alternates to be followed if the primary vertical market does not produce contracts. Opportunities that do not fit within the limits of the tactical business plan or do not focus on the longer term strategic goals must be declined before any serious resource commitments take place.

Most vendors have focused on one or more vertical industry markets where a successful implementation can be leveraged to other clients in the same industry or to enhancements to the original contract. This focus reflects the importance of application experience. More recently, however, specialists in cross-industry (non-industry-specific) technologies have teamed with industry-specific vendors to improve prospects of awards.

3. Agency Opportunities

Systems integrators' views on future SI opportunities at federal agencies are presented in Exhibit V-6. More contractors foresee DoD opportunities decreasing than increasing. Fewer than 21% of the contractors predict their SI opportunities will remain the same among DoD agencies. All respondents who answered this question suggested that SI opportunities with the civil agencies would increase.

EXHIBIT V-6

Vendor Views of Agency SI Opportunities GFY 1990 - GFY 1995 (Percent)

Agency Type	Increasing	Decreasing	Remaining the Same
DoD	29.2	50	20.8
Civil	100	0	0

The vendor views of civilian agency opportunities were extremely positive. All vendors believed there will be an increase in SI projects during the GFY1990-1995 period. (The civilian agencies lagged behind the DoD in ADP modernization during the early 1980s.) INPUT believes this shift in SI opportunities is due to civilian agencies' finally catching up to their DoD counterparts in modernizing operations. Technology advances—e.g., image-based processing and publishing systems and office automation products—are making it easier for agencies to automate many functions.

When asked to specify particular agencies that offered the most attractive SI opportunities, vendors always cited at least two agencies. Exhibit V-7 lists the agencies that received multiple mentions by respondents. Additional agencies cited by vendors included were:

U.S. Government Agencies:

- Department of Agriculture
- Department of Health and Human Services
- Social Security Administration
- Intelligence agencies
- Department of Housing and Urban Development
- Department of Interior
- U.S. Senate

International Agencies:

- NATO

EXHIBIT V-7

Agencies Offering the Most Attractive SI Opportunities

Agency	Percent of Respondents
Treasury	46
Transportation	42
Defense	29
Army	25
Education	21
EPA	21
Air Force	17
GSA	13
NASA	13
Postal Service	13
State	13

Systems integration opportunities exist across a wide spectrum of federal agencies. Vendors in INPUT's sample do not expect to concentrate their activities in one or two agencies, but pursue contracts wherever SI opportunities are presented.

Also, federal SI contractors expect to see greater growth of their SI opportunities within the federal market (36%) than in the commercial market (29%). Since INPUT forecasts only 14% growth in the federal SI market from GFY 1990 to GFY 1995, this low figure suggests that current SI services vendors have a healthy confidence in their ability to compete in the federal SI marketplace.

D**Vendor Perceptions
of Federal Systems
Integration**

Commercial SI vendors were asked to rank the importance of several technologies in federal SI projects. Exhibit V-8 shows the rankings.

EXHIBIT V-8**Importance of Technologies to Federal SI Projects**

Technology	Importance	Comments
Computer Security	Major	Seems to impede user access Govt. slow to appreciate need
Communications	Major	
Network Management	Major	
LAN Integration	Major	
FTS 2000	Minor	

Vendors were also asked to identify issues associated with bidding problems, pricing problems, and delivery problems.

- a. Bidding problems. The single most frequently mentioned issue associated with bidding problems is the high cost and time required for proposal preparation, followed by inadequate (vague or unrealistic) specifications. Likewise, unrealistic schedules (including the observation that the procurement cycle is too long for current technology cycles) and difficulty achieving a winning price/performance balance were issues with the SI vendors.
- b. Pricing problems. The most frequently cited issue associated with pricing problems was the government's (apparently successful) attempt to obtain commodity pricing for custom projects. Coupled with this attempt was the perception that the government inappropriately demands firm-fixed-price contracts for ill-defined requirements. Also, vendors had problems with multiyear pricing—especially where vendors were bidding third-party supplies and services and have difficulty guaranteeing the third-party participants' out-year pricing.

- c. Delivery problems. Vendors' problems with delivery dealt with relatively few areas. Problems cited were: deliveries from (third-party) OEMs are difficult to enforce; vendors are being penalized by agencies' unrealistic (not related to foreseeable need) delivery schedules; vendors are penalized by harsh evaluations against poorly defined work definitions.

Much of the difficulty described in the preceding paragraphs results from the government's need to reduce the costs associated with procurement of information technology (both goods and services). In practice, information technology is perceived as increasing the costs associated with bidding and, thus, with delivery of these goods and services.

E

Commercial versus Federal Systems Integration

1. Market Differences

The federal government has relied on systems integrators to develop, upgrade, or replace automatic data processing systems for over thirty years. Commercial systems integration, with some of its roots in federal SI, has striking similarities and important differences with government contracting, as shown in Exhibit V-9.

The commercial sector customer is less likely to have the legal or technical background required for many projects; when this knowledge is available, it is available only in pieces from numerous personnel within the client organization. In the federal government, on the other hand, the thrust has been the establishment of project offices that include technical and legal representatives that speak for the sponsoring agency.

A key difference of vendor characteristics is the formality with which vendor reputation is evaluated as a part of the bid selection procedures in the federal marketplace. In most cases, a vendor's estimated versus actual performance on cost and schedule measures is recorded (the Defense Contract Audit Agency does this for Defense but makes the evaluations available to all agencies). Agencies use this historic information to specifically and formally weigh the vendor's past performance.

In the commercial world, a federal track record of successful implementations may be desirable and leverageable. Customer business knowledge is a key requirement because the commercial customer looks to the vendor to offer a business solution. State and federal agencies are more specific about the desired solution, at least functionally, and less dependent on vendor business consulting/recommendations.

EXHIBIT V-9

Commercial versus Federal Systems Integration Characteristics

Characteristic	Commercial	Federal
<u>Customers</u>		
Requirements knowledge	Low	High
Technical knowledge	Variable	High
Interface	Multiple	Single
<u>Vendors</u>		
Vertical expertise	Preferred	Mandatory
Customer base	Leverageable	Reference
Business knowledge	Required	Optional
Reputation	Media-based	Historic
<u>Business Conditions</u>		
Lead generation	Field sales	CBD/budgets
Competitive bids	Optional	Required
Bid complexity	Variable	High
Expenditure commitment	Deferrable	Guaranteed
Risk exposure	High	Contained
Contract type	Fixed-price	Combination
Price restrictions	Competitive	Ceilings
Bonuses	Unlikely	Award/incentive
Penalties	Unlikely	Exception
Profit potential	High	Limited

The business conditions associated with the two markets are widely divergent, with some definite advantages to the government market. The federal agencies advertise in the Commerce Business Daily about upcoming solicitations, and describe key programs in publicly available documentation. Commercially, the vendor is nearly totally dependent on the sales force for leads.

The requirement for competitive bids for expenditures over \$100,000 in the federal sector has no counterpart in the commercial world. Although competition may be a vehicle for the client to achieve the best solution at the best price, other factors (vendor reputation, comfort level with the vendor, etc.) do come into play. Further, the requirements for competition are such that agencies may not generally specify name brand products in the request for proposal (RFP). The federal process is more open and public; the result is a great deal of competition in which discounting or fixed-price bidding is frequent.

Competitive bidding in the federal sector makes for complexity that involves more time, effort, and money on the part of the vendors, with no assurance of award. Bidding expenses are recoverable but stringently controlled.

The trade-off is that once the process starts in the federal sector, the expenditures are virtually guaranteed, or termination costs are paid to close the project. In the commercial area, expenditure commitments may be deferred or withdrawn at the client's choosing with no recourse for the bidding vendors. Bill collecting also sometimes presents a problem in commercial contracts.

The risks to the contractor appear to be much greater in the commercial marketplace. The contracting rules in the federal arena lead to compliance with the letter of the specifications and some measure of risk-sharing with the client agency. The absence of these rules in the commercial marketplace creates an environment where the specifications are more at issue and, consequently, more subject to interpretation (and misinterpretation); the result is the prospect of contract performance suits.

Unless the contract is fixed price, federal regulations may specify price ceilings. Fair pricing regulations specify that profit can be no more than 15% and permit agencies to audit vendor records to verify these conditions. There are no counterpart rules in the commercial sector, where competition and demand determine the acceptable price range.

Vendor capabilities in the commercial sector are usually based on written proof, previous success testimony, or live test demonstrations simulating a critical function of the desired system. In the federal marketplace these capabilities are frequently required to be proven by scores under the Weighted Guidelines, actual performance against standards (benchmarks) established for the project's system, or "compute-offs" against competitors.

Pricing strategies differ in that commercial jobs are frequently fixed-price without bonuses but with penalties. Government contracts are typically fixed-price and cost-plus for medium-sized jobs. Further, it is not unusual for the government to reward a contractor for a low-price bid (award fee) or provide incentives for beating cost or schedule estimates.

In-depth reviews of component performance are required by contracts of federal agencies as a means of verifying/validating a contractor's work. This practice will be found less frequently in the commercial arena.

The commercial/federal SI market distinctions revolve around the formality and regulatory backbone of the process. Some of these more formal practices of the federal and state government market are being adopted by the commercial market where exposure to new regulations make the benefits obvious. Commercial clients will eventually adopt practices that protect them.

2. Commercial and Federal Market Directions

In the current survey, SI services vendors were asked to project their revenue growth in the federal and commercial agency markets. Exhibit V-10 shows both the range and the average revenue growth as estimated by the survey respondents. It is interesting to note that vendors exhibit slightly higher confidence in the federal market.

EXHIBIT V-10

Respondents' Forecast of Revenue Growth

Sector	Percent		
	Low Estimate	High Estimate	Average
Commercial	0	80	29
Federal	2	100	36

F**Strategies for Success**

There are several key strategic elements to be considered in entering the federal SI market. Containing the risk element and consciously managing each project to reduce the possibility of failure is an essential part of continued participation in the market and the future of SI procurements in general. The vendor's reputation plays a key role in the proposal evaluation process.

To be successful in the federal SI market, the vendor must acquire a comprehensive understanding of the federal information systems acquisition process. Systems design, programming, and project management talent are the second-most-important components of the vendor's strategy, the first being a ground-level understanding of the procurement rules. These qualities are needed to solve increasingly complex technical problems that require complex solutions.

SI offers federal vendors the opportunity to capture agency accounts. Because of the critical importance of these systems to the end user and because the duration of the contract will be multiyear, the vendor has an excellent opportunity to develop a unique customer relationship that can replace existing relationships.

Moreover, most, if not all, SI projects are functionally so complex that no single vendor usually can expect to satisfy the user's requirements alone. Agency requirements include: complex communications links, mixing older and advancing technology in networks and LANs, and converting older software into new. As a result, leases between vendors and agencies will be formed that will be difficult to compete against or break. It is therefore crucial for vendors to choose, early on, partnerships that serve vendors' best long-term strategic interests.

To properly prepare for the federal SI competitive environment over the next five years and beyond, vendors now must choose the envelope of services, agencies, and skills that will be the focus of SI efforts. Vendors can then identify capabilities, products, and services that are needed to complement their own catalogs and can begin selection of the ideal partner or partners that can not only provide the skills needed but enhance the vendor's image and therefore the likelihood of obtaining business.

1. Growing Demands and Staff Shortages

Demand from all agencies for additional support is ever increasing. Systems integration projects are seen as promoting efficiency in the civil agencies' administration systems and savings in the DoD.

- Agencies have a need for networks that tie inter- and intra-agency groups together, especially in large geographically dispersed organizations. Agencies also need networks that tie government buyers and sellers together for the electronic exchange of data that ranges from orders to invoices, bills of lading to receipt-of-goods acknowledgments.
- The development of efficient and effective office information systems permits document exchange capabilities between various media (data, text, image), multiple layers of computing (personal, departmental, and agencywide), and various types of equipment from a multitude of vendors.

Many of the existing data processing systems lack the transaction speed and size to satisfy requirements. The aging of equipment in the face of increasing demands requires that obsolete systems be replaced on a timely and continuing basis. This concern becomes all the more urgent as technology advances and offers new capabilities. Supersystems have moved from the "desirable" to the "necessary" category. These systems integrate several applications bound to fourth-generation languages, agency data base management systems, data that ranges from the personal level to the agency level and beyond, and end-user tools that range to intelligent workstations requiring mainframe links.

Although many federal executives exhibit a desire to apply these technologies, few total solutions are available to link information systems to overall agency plans. And, to the chagrin of many organizations, the internal staff skills to handle the technical demands of these integration efforts are weak or unavailable.

This apparent lack of in-house skills has often been blamed on adherence to OMB Circular A-76 policies that have reduced in-house staffs. Loss of personnel at central design activities appears to be more related to the lack of growth opportunities in-house and the availability of better paying jobs in the private sector. Hiring freezes dictated by budget cuts (including the GRH effects) have reduced agency capabilities to maintain existing systems. Where the systems are critical to mission fulfillment, development efforts continue with little regard for current budget impacts.

In most cases, demand for new and better systems has outstripped the ability of the internal staff to meet the requirements at all, let alone on time and within budget. The staff is simply too mired in day-to-day operations to meet new requirements. Even if staff time were available, the complex problems often require multivendor solutions that are outside the capabilities of the personnel. Internal development can be costly in terms of delays in other, less critical projects.

2. Pervasiveness of Information Systems

Agency management has shown an increasing desire to automate the very core of its mission activities. In the current constrained budget environment, agencies cannot wait for internally developed solutions in such areas as financial decision support, support to the public, and management reporting and logistics.

This pervasiveness has also brought forth a concern for the proper management of the agency's information systems assets (spurred by the Paperwork Reduction Act)—including hardware, personnel, and data/information. Agencies have moved from a reactive to a proactive orientation. This new orientation requires the containment of costs and the leveraging of assets, the reduction of maintenance costs, and the prioritization of development efforts.

3. Demands for Productivity

Management has also focused on increasing productivity throughout the organization. Management organizations feel that part of the problem with the lack of growth in output that has followed significant investments in information systems is the technical-absorption bottleneck. The absence of a strong agency SI plan (despite A-130 requirements) has led to fragmented systems, and the proliferation of "solutions" has caused not only confusion among possible directions but more-fragmented systems from packaged solutions that are not a good fit.

From the agencies' perspective, then, systems integration has several attractive characteristics, as shown in Exhibit V-11. First, SI offers an approach to meeting mission objectives rapidly. Second, the integrator assumes at least some of the risk of development. At once, this assumption of risk starts to relieve the clients of the worry that the system will be built at all and provides greater assurance that the project will be completed on time and within budget. After all, it is in the contractor's best interest to bring projects in on time or sooner. Bringing in a project ahead of schedule saves costs to the contractor. If the integrator fails for any reason, the agency client is risking only the time and money to the point of failure and can point to a sole source for accountability. Also, where SI efforts are successful, fragmented and redundant systems can be eliminated, to be replaced by comprehensive, monolithic systems. SI contractors typically have experience in the areas of development for which they are contracted; this pays off in time (and, thus, dollar) savings during the implementation phase.

The agency hopes to be relieved of the time-consuming and potentially confusing logistics of finding and controlling several contractors. It depends on outside contractors to fulfill project management functions.

The assumption is that the integrator has or will develop solid business and technical relationships with the vendors that will be involved in the solution, and that these relationships will smooth the interaction of multiple vendors. In the worst case, these vendor problems get passed on to the integrator, not the client.

In an SI effort it becomes the integrator's responsibility to integrate divergent and incompatible products. This arrangement usually requires a level of technical sophistication that the user organization does not possess. Office information systems, for example, require a strategic office systems architecture that incorporates and interconnects multiple media, levels of computing, and functionality. These electronic offices require highly advanced communications and integration of data, information, and knowledge bases.

EXHIBIT V-11

Agencies' View: Attractive Characteristics of SI Approach

- Meets mission objectives rapidly
- Reduces risk of systems development
- Acquired project management functions
- Integrates complex, fragmented systems
- Saves costs over internally developed solutions
- Uses new technology to achieve optimum solution

The agency also hopes to capitalize on the integrator's industry and applications experience in both the development and postimplementation phases. The project involves state-of-the-art and state-of-the-industry expertise that the vendor will bring to the effort.

The agency views the potential economies of scale offered by the integrator as a plus. If an integrator is working on multiple projects or has an established distribution channel for products from other vendors, it is likely that products/services are being acquired in such volume or with such regularity that the integrator will get a "price break" that will be passed on to the client.

A systems integration approach also solves the problem of unavailable in-house project management skills. INPUT studies consistently show that IRM management feels that project management skills and certain technical skills, especially systems design, are lacking in their agencies. Many, if not most, MIS departments have a mediocre record of completing major projects on budget and on time. SI solves this problem by transferring responsibility to a third party that can demonstrate these skills. Agencies assign the responsibility to do the work to outside parties without loss of authority, and the work gets done more effectively.

SI vendors were asked to rank the importance of the same SI contract selection criteria that were identified in Exhibit IV-6. Vendors' rankings as shown in Exhibit V-12.

EXHIBIT V-12

SI Vendors' Rankings of Selection Criteria for SI Contract Awards

Rank	Selection Criteria
1	Contract type
2	Initial cost
3	Risk containment
4	Project management
5	Technical solution
6	Life cycle cost

Vendors found contract type to be the most important criterion. Technical solution, the agencies' first-ranked criterion, was rated very low by the vendors. Agencies looked to life cycle costs; vendors were more interested in the initial costs.

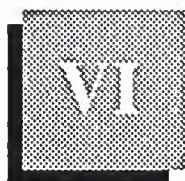
4. Vendors' Recommendations for Success

Vendors were asked to identify successful bidding strategies. (At least one respondent suggested “pie-in-the-sky promises.”) Most frequently, however, the serious responses centered on cost control to bring down the bid price. The next most frequent responses suggested developing an expertise in a niche market and forming alliances with OEM suppliers and other niche experts. Other strategies addressed reliance on open architectures—avoid any product bias and choose minimum compliance with specifications (unless clearly requested otherwise, bid only what the government requires, not what vendors think it should need).

INPUT asked commercial SI vendors to rate the business prospects of small-to-midsize firms in performing federal SI projects. The responses ranged from “excellent” to “poor.” In general, respondents suggested that:

- Small-to-midsize firms do best in a niche-expertise market.
- Small-to-midsize firms do best teamed with a large firm with overall expertise and economic resources to perform an entire project.
- Small-to-midsize firms are at a competitive disadvantage if they are not “8(a)” (disadvantaged minority) firms. Non-8(a) firms are squeezed between the protected-program firms and the larger businesses with their greater economic strength.

Thus, INPUT’s vendor survey suggests that a small-to-midsize firm can succeed by choosing carefully the market area and the competitive environment (subcontractor or alliance with a vendor having complementary skills, or both) in which it will compete. Also, assuming that it has the required skills, a small-to-midsize firm can compete by controlling its costs, especially labor costs.



Key Opportunities

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This section describes specific opportunities in the federal information technology market. Two lists of programs are provided.

- Recent Awards
- Future Systems Integration Opportunities

Although neither opportunity list is all-inclusive, both include major programs that are typical of the federal market.

The list of opportunities becomes smaller after FY1991 because new programs have not yet been identified or initially approved by the responsible agency. Also, due to budget uncertainty, many potential SI opportunities do not have funding firmly identified. Subsequent issues of this report and the INPUT Procurement Analysis Reports will include additional programs and detailed program information for FY1991 to FY1995.

A

Present and Future Programs

New information technology programs that are larger than \$1-2 million are listed in at least one of the following federal government documents:

- OMB/GSA Five-Year Plan, which is developed from agency budget requests submitted in compliance with OMB Circular A-11
- Agency long-range information resource plans developed to meet the reporting requirements of the Paperwork Reduction Reauthorization Act of 1986
- Agency annual operating budget requests submitted to congressional oversight and appropriations committees based on the OMB A-11 information

- Commerce Business Daily for specific opportunities for qualifications as a bidder, and invitations to submit a bid in response to an RFP or RFQ
- Five-Year Defense Plan, which is not publicly available, and the supporting documentation of the separate military departments and agencies
- Classified program documentation available only to qualified DoD contractors

Systems integration opportunities may not be specifically identified as such in these documents. Information technology planning documents usually identify mission requirements to be met by specific programs rather than methods for meeting those requirements. An agency decision to use a systems integration contractor may not be made until a program is well under way and an acquisition plan has been formulated. Over the last several years, however, agencies have shown an increasing tendency to use systems engineering and integration contractors for larger, more complex systems.

All funding proposals are based on cost data of the year submitted with inflation factors dictated by the Administration as part of its fiscal policy, and are subject to revision, reduction, or spread to future years in response to congressional direction. Additional reductions to all agencies' budgets are likely in FY 1991 and beyond because of the deficit reduction compromise passed in October of 1990.

B**Recent Awards**

Value Agency/Program	Contractor	\$ Million
Air Force		
Air Force Equipment Management System	Martin Marietta	70.0
Army		
Corps of Engineers Automation Plan Object	CDC	365.0
Army CALS	BDM	4.4
Army CALS	XEROX	4.1
Army CALS	CSC	2.7
Army CALS	TRW	4.6
Military Pay Redesign	IBIS	16.2
Joint Service Software		
Military Pay Redesign	Federal Computer Corp.	4.5
Joint Service Software		
Navy		
Large-Scale Computer System	Grumman Data Systems	204.6
Defense		
Data Storage Devices	Storage Technology	33.0
DLSC Modernization and Integrated Data	Grumman Data Systems	60.7
Defense Medical Systems Support Center	Contel Federal Systems	42.0
Defense Medical Systems Support Center	MCI Communications	25.0
Agriculture		
ASCS/FAS IRM Integration	CBIS	9.5
Commerce		
Online Data Storage	Unisys	20.0
Interior		
Applicant Violator System	Science Management Corp.	4.0
Transportation		
Data Link Processor	CSC	47.0
Treasury		
Distributed Input System Augmentation	Memorex Telex Corporation	1.4
Software Development & Operational Support	Pan Am World Services	9.5

Value Agency/Program	Contractor	\$ Million
NASA		
Customer Data & Operations System	Martin Marietta	2.5
Customer Data & Operations System	TRW	2.5
Training Systems Center	CAE-Link Corp.	517.0
Mission Systems Contract	Ford Aerospace	469.0
Mission Systems Contract	CAE-Link	477.0
Mission Systems Contract	Grumman Data Systems	47.7
EPA		
Workstation Acquisition	American Coastal Industries	67.5
Total of List:		2,511.4

C

Systems Integration Opportunities by Agency

Agency/Program	PAR Reference	RFP Schedule	FY 1990-FY 1995 Funding (Est. \$ Million)
Air Force			
Joint Uniform Services Technical Information System	V-1-53	01/01/92	.0*
Air Force CALS	V-1-108	**	230.0
Automated Records Management System	V-1-124	01/01/91	.0*
Joint Staff Automation into the Nineties	V-1-126	01/01/91	10.2
Army			
Army WWMCCS Information System	V-2-8	**	.0*
Integrated Procurement System	V-2-39	**	9.3
Sustaining Baseline Information Services	V-2-43	07/01/91	500.0
Common Hardware/Software II	V-2-51	07/01/91	2,000.0
Navy			
CAD/CAM II	V-3-14	**	64.2
Navy CALS	V-3-80	**	.0*
Navy WWMCCS ADP Mode	V-3-83	**	28.5
Inventory Control Points	V-3-121	1/20/91	.0*

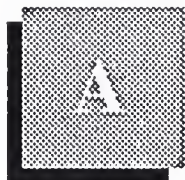
Agency/Program	PAR Reference	RFP Schedule	FY 1990-FY 1995 Funding (Est. \$ Million)
Defense Dept.			
DLA CALS	V-4A-14	**	.0*
DoD CALS	V-4E-4	**	.0*
Joint Operations Planning and	V-4G-5	01/01/91	207.1
Agriculture			
Project 615	VI-5-30	**	106.5
Integrated Systems Acquisition Project	VI-5-34	03/01/91	.0*
EPA			
Environmental Monitoring and Assessment System	VIII-17-13	**	.0*
GSA			
Replacement PBS/IS	VIII-14-23	02/01/91	78.8
Health & Human Services			
HCFA Data Center	VII-8-42	10/01/92	.0*
Interior			
Bureau of Land Management ADP Modernization Project	VII-9-11	04/01/91	128.9
Justice			
FBI Field Office Information Management System	VII-10-2	**	488.8
National Prisoner Transportation System	VII-10-23	**	2.0
NASA			
NASA Occupational Health Management Information System	VIII-15-70	**	.0*
OPM			
Federal Employees Retirement System Automated Processing System	VIII-20-2	12/30/90	55.3
Transportation			
Marine Safety Network	VII-11-32	01/01/91	15.1
Vessel Identification Information System	VII-11-36	01/01/91	14.6

Agency/Program	PAR Reference	RFP Schedule	FY 1990-FY 1995 Funding (Est. \$ Million)
Treasury			
Tax Modernization Effort	VII-12-6	**	276.5
Corporate Files Online and Corporate Systems/Mirror Imaging	VII-12-67	08/01/91	692.3
Document Processing System	VII-12-67	04/01/91	652.6
Veterans Affairs			
DVB Modernization	VIII-16-11	01/01/91	75.1

* Funding not identified

** RFP Schedule not stated

Source: INPUT Procurement Analysis Reports (PAR)



Interview Profiles

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A

Federal Agency Respondents Profile

1. Contact Summary

Contacts with agencies were made by telephone and through the mail. Interviews were conducted primarily at the department level with officials in the Office of Information Resources Management. These officials are responsible for office systems policy and planning.

The distribution of job classifications among individual agency respondents for the 1990 analysis was as follows:

	Policy	Buyers	Users	Total
Respondents	4	15	5	24

2. List of Agencies

Respondents interviewed in 1990 represented the agencies listed below, with the number in parentheses indicating the number of different contacts within the agency if more than one contact was made.

Department of Defense

- Air Force (2)
- Army (3)
- Navy (5)
- Marine Corps
- Defense Logistics Agency
- Defense Communications Agency (2)

Civil Agencies

- Department of Agriculture
- Department of Justice (2)
- National Aeronautics and Space Administration (4)

- Department of the Treasury (2)
- General Services Administration

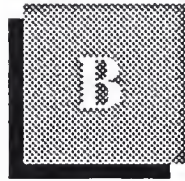
B**Vendor Respondents
Profile**

For the 1990 study, INPUT contacted a representative sample of vendors providing systems integration to the federal government. Job classifications among individual vendor respondents included marketing as well as administrative executives.

Contacts with vendor personnel were made by telephone and by mail.

C**Case Study
Respondent Profile**

Respondents who provided case study profiles on the systems integration project included prime contractor representatives.



Definitions

The definitions in this appendix include hardware, software, services, and telecommunications categories to accommodate the range of information systems and services programs described in this report.

Alternate service mode terminology employed by the federal government in its procurement process is defined along with INPUT's regular terms of reference, as shown in Exhibit B-1.

The federal government's unique, nontechnical terminology, associated with applications, documentation, budgets, authorization, and the procurement/acquisition process, is included in Appendix C, Glossary of Federal Acronyms.

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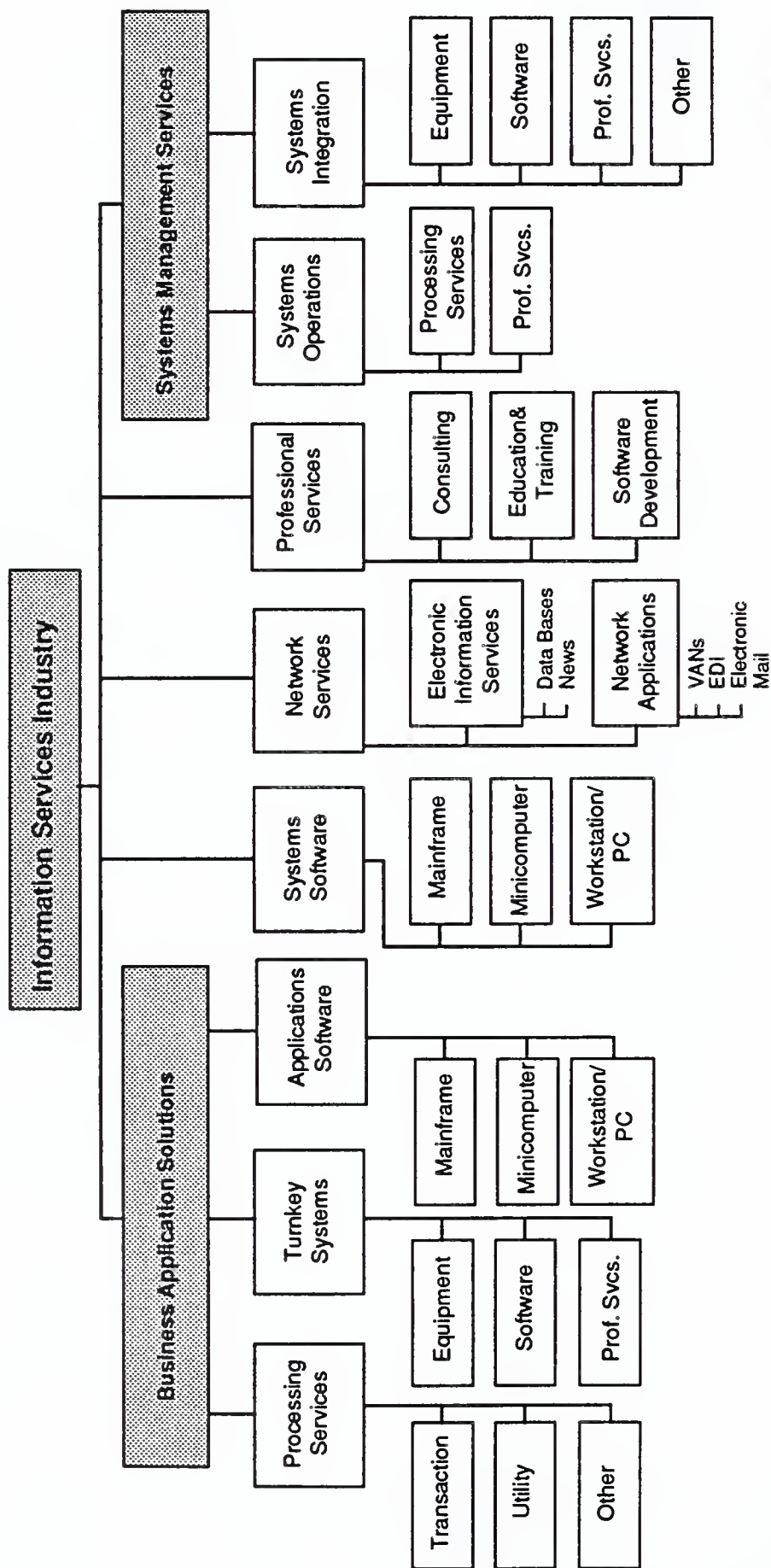
Delivery Modes

Processing services - This category includes transaction processing, utility processing, other processing services, and processing facilities management.

- **Transaction Processing Services** - Updates client-owned data files by entry of specific business activity, such as sales order, inventory receipt, cash disbursement, etc. Transactions may be entered in one of these modes:
 - **Interactive** - Characterized by the interaction of the user with the system, primarily for problem-solving timesharing, but also for data entry and transaction processing; the user is on-line to the program files. Computer response is usually measured in seconds or fractions of a second.
 - **Remote Batch** - The user hands over control of a job to the vendor's computer, which schedules job execution according to priorities and resource requirements. Computer response is measured in minutes or hours.

EXHIBIT B-1

Information Services Industry Structure—1990



Source: INPUT

User Site Hardware Services (USHS) - Those offerings provided by processing services vendors which place programmable hardware at the user's site, rather than at the vendor's data center. Some vendors in the federal government market provide this service under the label of distributed data services. USHS offers the following:

- Access to a communications network
- Access through the network to the RCS vendor's larger computers
- Local management and storage of a data base subset that will serve local terminal users via the connection of a data base processor to the network
- Significant software as part of the service
- Utility Processing - Vendor provides access to basic software tools, enabling the users to develop their own problems solutions such as language compilers assemblers, DBMS, sorts scientific library routines, and other systems software.

Other processing services include the following:

- Batch Services - These include data processing at vendors' sites for user programs and/or data that are physically transported (as opposed to transported electronically by telecommunications media) to and/or from those sites. Data entry and data output services, such as keypunching and computer output microfilm processing, are also included. Batch services include expenditures by users who take their data to a vendor site with a terminal connected to a remote computer for the actual processing. Other services also includes disaster recovery and backup services.
- Systems Operations (Processing) - Also referred to as Resource Management, Facilities Management or COCO (contractor-owned, contractor-operated). Systems control is the management of all or part of a user's data processing functions under a long-term contract of not less than one year. This would include remote computing and batch services. To qualify, the contractor must directly plan, control, operate, and own the facility provided to the user, either onsite, through communications lines, or in a mixed mode.

Processing services are further differentiated as follows:

- Cross-industry services involve the processing of applications targeted to specific user departments (e.g., finance, personnel, sales) but cutting across industry lines. Most general-ledger, accounts receivable, payroll, and personnel applications fall into this category.

Cross-industry data base services, for which the vendor supplies the data base and controls access to it (although it may be owned by a third party), are included in this category. General-purpose tools such as financial planning systems, linear regression packages, and other statistical routines are also included. When the application, tool, or data base is designed for specific industry use, however, the services are industry-specific (see below).

- Industry-specific services provide processing for particular functions or problems unique to an industry or industry group. Specialty applications can be used for either business or scientific purposes. Industry-specific data base services, for which the vendor supplies the data base and controls access to it (although it may be owned by a third party), are also included under this category. Examples of industry-specialty applications are seismic data processing, numerically controlled machine tool software development, and demand deposit accounting.

Network services include a wide variety of network-based functions and operations. The common thread is that more of these functions could be performed without network involvement. Network services is divided into two segments: value-added networks (enhanced services) and network applications (electronic information systems).

- Value-Added Networks (VANs) - VANs typically involve common carrier network transmission facilities augmented by computerized switches. These networks have become associated with packet-switching technology because the public VANs that have received the most attention (e.g., Telenet and TYMNET) employ packet-switching techniques. But other added data service features such as store-and-forward message switching, terminal interfacing, error detection and correction, and host computer interfacing are of equal importance.
- Network applications include Electronic Data Interchange (EDI), the application-to-application electronic communications between organizations, based on established business document standards, and electronic mail.

Software products - This category comprises user purchases of applications and systems software packages for in-house computer systems. Included are expenditures for lease and purchase, and for work performed by the vendor to implement or maintain the package at the user's sites. Expenditures for work performed by organizations other than the package vendor are counted in the category of professional services. Fees for work related to education, consulting, and/or custom modification of software products are counted as professional services, provided such fees are charged separately from the price of the software product itself. Software products have several subcategories, as indicated below and shown in detail in Exhibit B-2.

EXHIBIT B-2

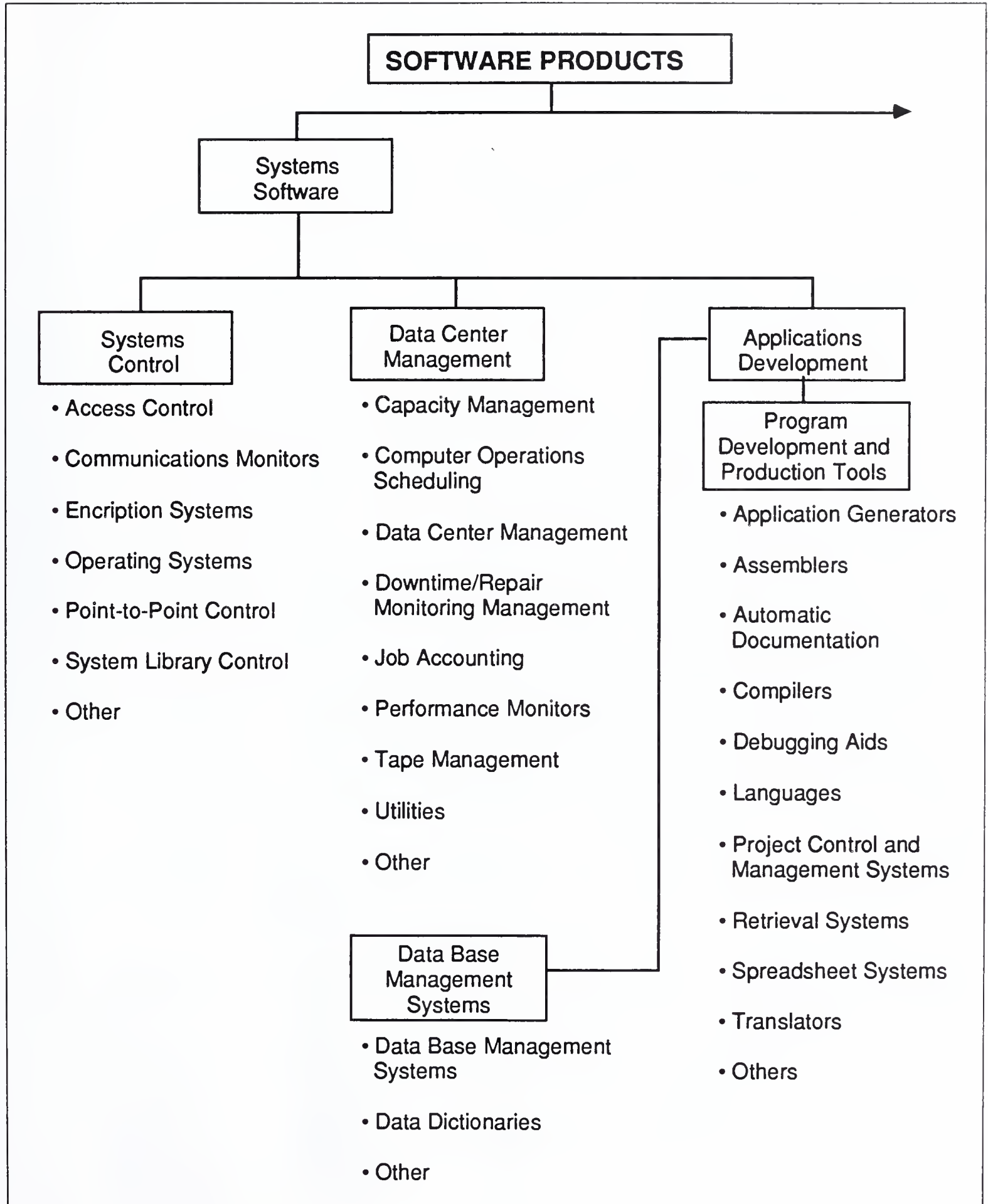
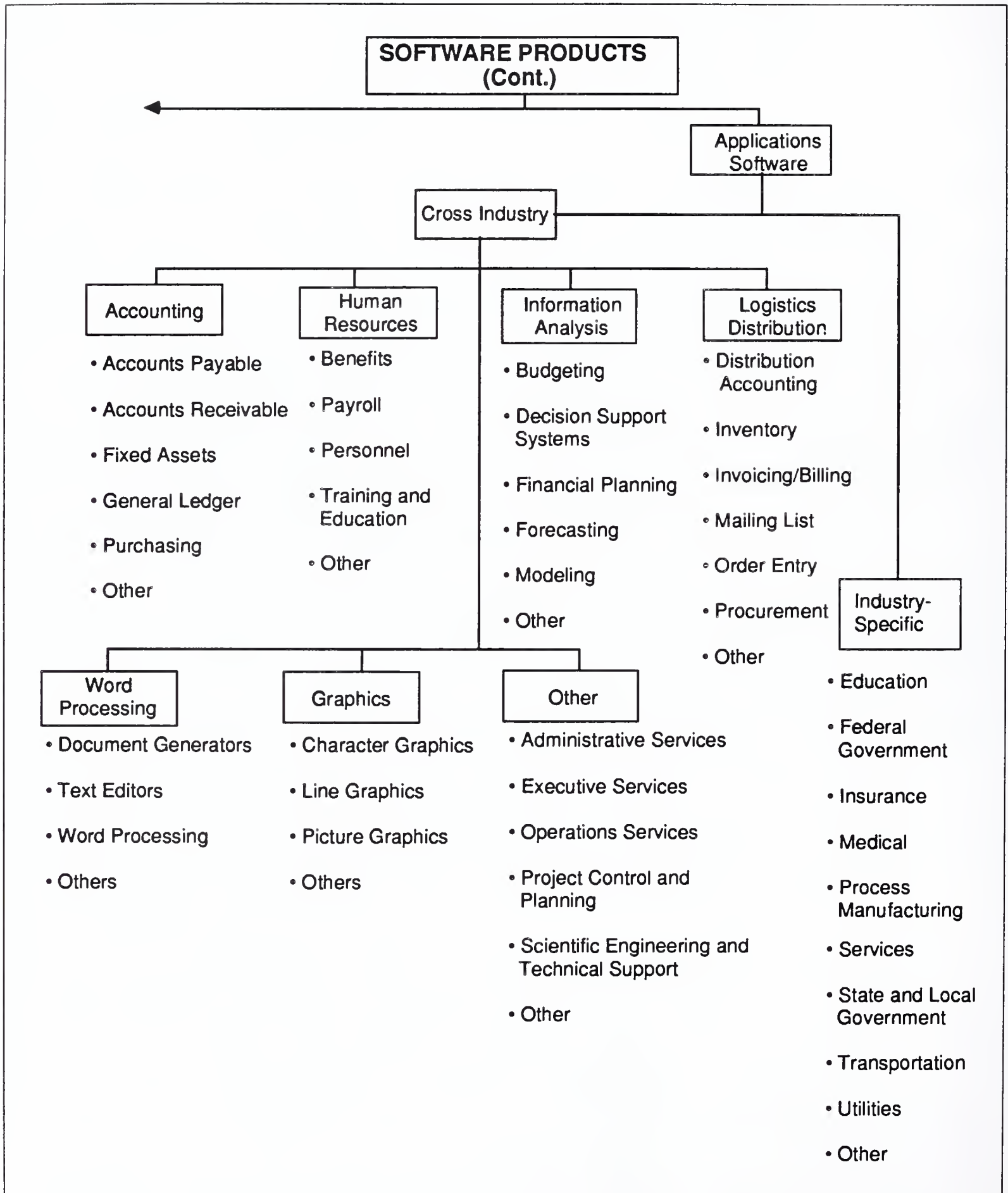


EXHIBIT B-2 (Cont.)



- **Applications Products** - Software that performs functions directly related to solving user's business or organizational need. The products can be any of the following:
 - **Cross-Industry Products** - Used in multiple-industry applications as well as the federal government sector. Examples are payroll, inventory control, and financial planning.
 - **Industry-Specific Products** - Used in a specific industry sector, such as banking and finance, transportation, or discrete manufacturing. Examples are demand deposit accounting, airline scheduling, and material resource planning.
- **Systems Software Products** - Software enabling the computer/communications system to perform basic functions. These products include the following:
 - **System Control Products** - Function during applications program execution to manage the computer system resources. Examples include operating systems, communications monitors, emulators, spoolers, network control, library control, windowing, and access control.
 - **Data Center Management Products** - Used by operations personnel to manage the computer systems resources and personnel more effectively. Examples include performance measurement, job accounting, computer operations scheduling, utilities, and capacity management.
 - **Applications Development Products** - Used to prepare applications for execution by assisting in designing, programming, testing, and related functions. Examples include traditional programming languages, 4GLs, sorts, productivity aids, assemblers, compilers, data dictionaries, data base management systems, report writers, project control, and CASE systems.

Professional Services - This category includes consulting, education and training, software development, and systems operations, as defined below:

- **Software Development** - Develops a software system on a custom basis. It includes one or more of the following: user requirements definition, system design, contract, programming, and/or documentation.
- **Education and Training** - Products and/or services related to information systems and services for the user, including computer-aided instruction (CAI), computer-based education (CBE), and vendor instruction of user personnel in operations, programming, and maintenance

- Consulting Services - Information systems and/or services management consulting, project assistance (technical and/or management), feasibility analyses, and cost-effectiveness trade-off studies
- Systems Operations (Professional Services) - This is a counterpart to systems operations (professional services) except the computing equipment is owned or leased by the client, not by the vendor. The vendor provides the staff to operate, maintain, and manage the client's facility.

Turnkey Systems - A turnkey system is an integration of systems and applications software with CPU hardware and peripherals, packaged as a single application (or set of applications) solution. The value added by the vendor is primarily in the software and support. Most CAD/CAM systems and many small-business systems are turnkey systems. This does not include specialized hardware systems such as word processors, cash registers, or process control systems; nor does it include Embedded Computer Resources for military applications. They may be either custom or packaged systems.

- Hardware vendors that combine software with their own general-purpose hardware are not classified by INPUT as turnkey vendors. Their software revenues are included in the appropriate software category.
- Turnkey systems revenue is divided into two categories:
 - Industry-specific systems - Systems serving a specific function for a given industry sector such as automobile dealer parts inventory, CAD/CAM systems, or discrete manufacturing control systems
 - Cross-industry systems - Systems providing a specific function applicable to a wide range of industry sectors, such as financial planning systems, payroll systems, or personnel management systems
- Revenue includes hardware, software, and support functions.

Systems Integration - (SI) delivery of large, complex multidisciplinary, multivendor systems, incorporating some or all of these categories: systems design, programming, integration, equipment, packaged software, communication networks, installation, education and training, and SI related professional services and acceptance. Systems integration contracts typically take more than a year to complete, and involve a prime contractor assuming risk and accepting full responsibility.

B**Hardware/Hardware
Systems**

Hardware - Includes all computer and telecommunications equipment that can be separately acquired with or without installation by the vendor and not acquired as part of an integrated system

- **Peripherals** - Includes all input, output, communications, and storage devices (other than main memory) that can be connected locally to the main processor, and generally cannot be included in other categories such as terminals
- **Input Devices** - Includes keyboards, numeric pads, card readers, light pens and track balls, tape readers, position and motion sensors, and analog-to-digital converters
- **Output Devices** - Includes printers, CRTs, projection television screens, micrographics processors, digital graphics, and plotters
- **Communication Devices** - Includes modem, encryption equipment, special interfaces, and error control
- **Storage Devices** - Includes magnetic tape (reel, cartridge, and cassette), floppy and hard disks, solid state (integrated circuits), and bubble and optical memories

Terminals - Three types of terminals are described below:

- **User Programmable** - Also called intelligent terminals, including the following:
 - Single-station or standalone
 - Multistation, shared processor
 - Teleprinter
 - Remote batch
- **User Nonprogrammable**
 - Single-station
 - Multistation, shared processor
 - Teleprinter
- **Limited Function** - Originally developed for specific needs, such as point-of-sale (POS), inventory data collection, controlled access, and other applications

Hardware Systems - Includes all processors from microcomputers to supercomputers. Hardware systems may require type- or model-unique

operating software to be functional, but this category excludes applications software and peripheral devices, other than main memory and processors or CPUs not provided as part of an integrated (turnkey) system.

- **Microcomputer** - Combines all of the CPU, memory, and peripheral functions of an 8-, 16-, or 32-bit computer on a chip in various forms including:
 - Integrated circuit package
 - Plug-in boards with increased memory and peripheral circuits
 - Console including keyboard and interfacing connectors
 - Personal computer with at least one external storage device directly addressable by the CPU
 - An embedded computer which may take a number of shapes or configurations
- **Midsize Computer** - Typically a 32- or 64-bit computer with extensive applications software and a number of peripherals in stand-alone or multiple-CPU configurations for business (administrative, personnel, and logistics) applications; also called a general purpose computer. All Intel 80386, Motorola 68000-based systems, and large multiuser systems are included. Specific systems in this category are as follows: IBM 93XX systems; all Digital VAX series systems; and such common UNIX-based systems as those from Apollo and Sun are also included. Most large, shared-logic, integrated office systems—such as those from Wang, Hewlett-Packard, and Honeywell Bull—would also be considered midsize systems. However, this category does not include microcomputers (standalone, or shared), embedded systems, or CAD/CAM systems.
- **Large Computer** - Presently centered on storage controllers, but likely to become bus-oriented and to consist of multiple processors or parallel processor. Intended for structured mathematical and signal processing and typically used with general purpose, Von Neumann-type processors for system control. This term usually refers to traditional mainframes and supercomputers.
- **Supercomputer** - High-powered processors with numerical processing throughput that is significantly greater than the fastest general purpose computers, with capacities in the 100-500 million floating point operations per second (MFLOPS) range. Newer supercomputers, with burst modes over 500 MFLOPS, main storage size up to 10 million words, and on-line storage in the one-to-four gigabyte class, are labeled Class V to Class VII in agency long-range plans. Supercomputers fit in one of two categories:

- Real Time - Generally used for signal processing in military applications
- Non-Real Time - For scientific use in one of three configurations:
 - Parallel processors
 - Pipeline processor
 - Vector processor
- Supercomputer - Term applied to micro, mini, and large mainframe computers with performance substantially higher than attainable by Von Neumann architectures
- Embedded Computer - Dedicated computer system designed and implemented as an integral part of a weapon, weapon system, or platform; critical to a military or intelligence mission such as command and control, cryptological activities, or intelligence activities. Characterized by military specifications (MIL SPEC) appearance and operation, limited but reprogrammable applications software, and permanent or semipermanent interfaces. These systems may vary in capacity from microcomputers to parallel processor computer systems.

C

Telecommunications

Networks - Electronic interconnection between sites or locations; may incorporate links between central computer sites and remote locations and switching and/or regional data processing nodes. Network services typically are provided on a leased basis by a vendor to move data, voice, video, or textual information between locations. Networks can be categorized in several different ways:

- Common Carrier Network - A public access network, such as AT&T, consisting of conventional, voice-grade circuits and regular switching facilities reached by dial-up calling with leased or user-owned modems for transfer rates between 150 and 1200 baud
- Value-Added Network (VAN) - (See listing under Section B, Delivery Modes.)
- Local-Area Network (LAN) - Limited-access network between computing resources in a relatively small (but not contiguous) area, such as a building, complex of buildings, or buildings distributed within a metropolitan area. LANs use one of two signaling methods:
 - Baseband - Signaling using digital waveforms on a single-frequency band, usually at voice frequencies and bandwidth, and limited to a single sender at any given moment. When used for local-area networks, a baseband is typically used with TDM to permit multiple access.

- **Broadband** - Transmission facilities that use frequencies greater than normal voice-grade, supported in local-area networks with RF modems and AC signaling. Also known as wideband. Employs multiplexing techniques that increase carrier frequency between terminals to provide various services:
 - Multiple (simultaneous) channels via FDM (Frequency Division Multiplexing)
 - Multiple (time-sequenced) channels via TDM (Time Division Multiplexing)
 - High-speed data transfer rate via parallel mode at rates of up to 96,000 baud (or higher, depending on media)
 - Wide-Area Network (WAN) - Limited access network between computing resources in buildings, complexes of buildings, or buildings within a large metropolitan or wide geographical area. WANs use baseband or broadband signaling methods.
- **Transmission Facilities** - Includes wire, carrier, coaxial cable, microwave, optical fiber, satellites, cellular radio, and marine cable operating in one of two modes depending on the vendor and the distribution of the network
- **Mode** - may be either analog or digital:
 - **Analog** - Transmission or signal with continuous-waveform representation, typified by AT&T's predominantly voice-grade DDD network and most telephone operating company distribution systems
 - **Digital** - Transmission or signal using discontinuous, discrete quantities to represent data, record, video, or text in binary form
- **Media** - may be any of the following:
 - **Wire** - Varies from earlier, single-line, teletype networks, to two-wire standard telephone (twisted pair), to four-wire, full-duplex, balanced lines
 - **Carrier** - A wave, pulse train, or other signal suitable for modulation by an information-bearing signal to be transmitted over a communications system, used in multiplexing applications to increase network capacity
 - **Coaxial Cable** - A cable used in HF (high-frequency) and VHF (very

high frequency), single-frequency, or carrier-based systems, which requires frequent reamplification (repeaters) to carry the signal any distance

- Microwave - UHF (ultra-high-frequency) multichannel, point-to-point, repeated radio transmission, also capable of wide frequency channels
- Optical Fiber - Local signal distribution systems employed in limited areas, using light-transmitting glass fibers and TDM for multichannel applications
- Communications Satellites - Synchronous, earth-orbiting systems that provide point-to-point, two-way service over significant distances without intermediate amplification (repeaters), but requiring suitable groundstation facilities expand markets for those technologies, and leverage existing and new product lines. In effect, they are focused on using their typically limited professional services resources to maximize the return on their core business products. This is true in most cases for federal market vendors as well. Most hardware firms prefer to apply their own core business products, and cannot avoid the use of the hardware of other manufacturers. This policy may limit their ability to respond to all systems integration asynchronous or synchronous, half or full duplex.

D

General Definitions

ASCII - American National Standard Code for Information Interchange—Eight-bit code with seven data bits and one parity bit

Asynchronous - Communications operation (such as transmission) without continuous timing signals. Synchronization is accomplished by appending signal elements to the data.

Bandwidth - Range of transmission frequencies that can be carried on a communications path; used as a measure of capacity.

Baud - Number of signal events (discrete conditions) per second. Typically used to measure modem or terminal transmission speed.

Byte - Usually equivalent to the storage required for one alphanumeric character (i.e., one letter or number)

CBX - Computerized Branch Exchange—A PABX based on a computer system, implying programmability and usually voice and data capabilities

Central Processing Unit (CPU) - The arithmetic and control portion of a computer; i.e., the circuits controlling the interpretation and execution of computer instructions.

Centrex - Central office telephone services that permit local circuit switching without installation of customer premises equipment. Could be described as shared PBX service.

Circuit Switching - A process that, usually on demand, connects two or more network stations, and permits exclusive circuit use until the connection is released; typical of the voice telephone network, where a circuit is established between the caller and the called party.

CO - Central Office—Local telco site for one or more exchanges

CODEC - Coder/decoder, equivalent to modem for digital devices

Constant Dollars - Growth forecasts in constant dollars make no allowance for inflation or recession. Dollar value based on the year of the forecast unless otherwise indicated.

Computer System - The combination of computing resources required to perform the designed functions. May include one or more CPUs, machine room peripherals, storage systems, and/or applications software.

CPE - Customer Premises Equipment—DCE or DTE located at a customer site rather than at a carrier site such as the local telephone company CO. May include switchboards, PBX, data terminals, and telephone answering devices.

CSMA/CD - Carrier Sense Multiple Access/Collision Detect—Contention protocol used in local-area networks, typically with a multipoint configuration

Current Dollars - Estimates or values expressed in current-year dollars which, for forecasts, would include an allowance for inflation

Data Encryption Standard (DES) - Fifty-six-bit key, one-way encryption algorithm adopted by NIST in 1977, implemented through hardware ("S-boxes") or software. Designed by IBM with NSA guidance.

Datagram - A self-contained packet of information that does not depend on the contents of preceding or following packets and has a finite length

DCA - IBM's Document Content Architecture—Protocols for specifying document (text) format which are consistent across a variety of hardware and software systems within IBM's DISOSS

DCE - Data Circuit-terminating Equipment—Interface hardware that couples DTE to a transmission circuit or channel by providing functions to establish, maintain, and terminate a connection, including signal conversion and coding

DDCMP - Digital Data Communications Message Protocol —Data link protocol used in Digital Equipment Company's DECNET

DECNET - Digital Equipment Company's network architecture

Dedicated Circuit - A permanently established network connection between two or more stations; contrast with switched circuit

DEMS - Digital Electronic Message Service—Nationwide common carrier digital networks which provide high-speed, end-to-end, two-way transmission of digitally encoded information using the 10.6 GHz band

DIA - IBM's Document Interchange Architecture - Protocols for transfer of documents (text) between different hardware and software systems within IBM's DISOSS

DISOSS - IBM's DIStributed Office Support System - Office automation environment, based on DCA and DIA, which permits document (text) transfer between different hardware and software systems without requiring subsequent format or content revision

Distributed Data Processing - The development of programmable intelligence in order to perform a data processing function where it can be accomplished most effectively through computers and terminals arranged in a telecommunications network adapted to the user's needs

DTE - Data Terminal Equipment—Hardware which is a data source, link, or both, such as video display terminals that convert user information into data transmission, and reconvert data signals into user information

EBCDIC - Extended Binary Coded Decimal Interchange Code —Eight-bit code typically used in IBM mainframe environments

EFT - Electronic funds transfer

Encryption - Electric, code-based conversion of transmitted data to provide security and/or privacy of data between authorized access points

End User - One who is using a product or service to accomplish his or her own functions. The end user may buy a system from the hardware supplier(s) and do his or her own programming, interfacing, and installation. Alternately, the end user may buy a turnkey system from a systems house or hardware integrator, or may buy a service from an in-house department or external vendor.

Engineering Change Notice (ECN) - Product improvements after production

Engineering Change Order (ECO) - The follow-up to ECNs, including parts and a bill of materials to effect the change in the hardware

Equipment Operators - Individuals operating computer control consoles and/or peripheral equipment (BLS definition)

Ethernet - Local-area network developed by Xerox PARC using base-band signaling, CSMA/CD protocol, and coaxial cable to achieve a 10 mbps data rate

Facsimile - Transmission and reception of graphic data, usually fixed images of documents, through scanning and conversion of a picture signal

FDM - Frequency Division Multiplexing—A multiplexing method that permits multiple access by assigning different frequencies of the available bandwidth to different channels

FEP - Front-End Processor—Communications concentrator such as the IBM 3725 or COMTEN 3690 used to interface communications lines to host computers

Field Engineer (FE) - Field engineer, customer engineer, serviceperson, and maintenance person are used interchangeably and refer to the individual who responds to a user's service call to repair a device or system.

Full-Duplex - Bi-directional communications, with simultaneous, two-way transmission

General Purpose Computer System - A computer designed to handle a wide variety of problems. Includes machine room peripherals, systems software, and small business systems.

Half-Duplex - Bi-directional communications, but only in one direction at a time

Hardware Integrator - Develops system interface electronics and controllers for the CPU, sensors, peripherals, and all other ancillary hardware components. The hardware integrator also may develop control system software in addition to installing the entire system at the end-user site.

HDLC - High-level Data Link Control

Hertz- Number of signal oscillations (cycles) per second, abbreviated Hz

IBM Token Ring - IBM's local area network using baseband signalling and operating at 4 mbps on twisted-pair copper wire. Actually a combination of star and ring topologies—IEEE 802.5-compatible.

IDN - Integrated Digital Network—Digital switching and transmission; part of the evolution to ISDN.

Independent Suppliers - Suppliers of machine room peripherals, though usually not suppliers of general purpose computer systems

Information Processing - Data processing as a whole, including use of business and scientific computers

Installed Base - Cumulative number or value (cost when new) of computers in use

Interconnection - Physical linkage between devices on a network

Interoperability - The capability to operate with other devices on a network. Different from interconnection, which merely guarantees a physical network interface.

ISDN - Integrated Services Digital Network—Completely digital, integrated voice and nonvoice public network service. Not clearly defined through any existing standards, although FCC and other federal agencies are developing CCITT recommendations.

Keypunch Operators - Individuals operating keypunch machines (similar to electric typewriters) to transcribe data from source materials onto punch cards

Lease Line - Permanent connection between two network stations. Also known as dedicated or non-switched line.

Machine Repairers - Individuals who install and periodically service computer systems

Machine Room Peripherals - Peripheral equipment generally located close to the central processing unit

Mainframe - The central processing unit (CPU or units in a parallel processor) of a computer that interprets and executes computer (software) instructions of 32 bits or more

MAP - Manufacturing Automation Protocol - Seven-layer communications standard for factory environments promoted by General Motors/EDS. Adopts IEEE 802.2 and IEEE 802.4 standards plus OSI protocols for other layers of the architecture.

Mean Time to Repair - The mean of elapsed times from the arrival of the field engineer on the user's site to the time when the device is repaired and returned to user service

Mean Time to Respond - The mean of elapsed times from the user call for services and the arrival of the field engineer on the user's site

Message - A communication intended to be read by a person. The quality of the received document need not be high, only readable. Graphic materials are not included.

MMFS - Manufacturing Messaging Format Standard—Application-level protocol included within MAP

Modem - A device that encodes information into electronically transmittable form (MODulator) and restores it to original analog form (DEMODulator)

NCP - Network Control Program—Software used in IBM 3705/3725 FEPs for control of SNA networks.

Node - Connection point of three or more independent transmission points which may provide switching or data collection

Off-Line - Pertaining to equipment or devices that can function without direct control of the central processing unit

On-Line - Pertaining to equipment or devices under direct control of the central processing unit

OSI - ISO reference model for Open Systems Interconnection—Seven-layer architecture for application, presentation, session, transport, network, data link, and physical services and equipment

OSI Application Layer - Layer 7, providing end-user applications services for data processing

OSI Data Link Layer - Layer 2, providing transmission protocols, including frame management, link flow control, and link initiation/release

OSI Network Layer - Layer 3, providing call establishment and clearing control through the network nodes

OSI Physical Layer - Layer 1, providing the mechanical, electrical, functional, and procedural characteristics to establish, maintain, and release physical connections to the network

OSI Presentation Layer - Layer 6, providing data formats and information such as data translation, data encoding/decoding, and command translation

OSI Session Layer - Layer 5, establishes, maintains, and terminates logical connections for the transfer of data between processes

OSI Transport Layer - Layer 4, providing end-to-end terminal control signals such as acknowledgements

Overseas - Not within the geographical limits of the continental United States, Alaska, Hawaii, and U.S. possessions

PABX - Private Automated Branch Exchange—Hardware that provides automatic (electro-mechanical or electronic) local circuit switching on a customer's premises

PAD - Packet Assembler-Disassembler—A device that enables DTE not equipped for packet switching operation to operate on a packet switched network

PBX - Private Branch Exchange—Hardware that provides local circuit switching on the customer premise

PCM - Pulse-Code Modulation—Modulation involving conversion of a waveform from analog to digital form through coding

PDN - Public Data Network—A network established and operated by a recognized private operating agency, a telecommunications administration, or other agency for the specific purpose of providing data transmission services to the public

Peripherals - Any unit of input/output equipment in a computer system, exclusive of the central processing unit

PPM - Pulse Position Modulation

Private Network - A network established and operated for one user or user organization

Programmers - Persons mainly involved in designing, writing, and testing computer software programs

Protocols - The rules for communication system operation that must be followed if communication is to be effected. Protocols may govern portions of a network or service. In digital networks, protocols are digitally encoded as instructions to computerized equipment.

Public Network - A network established and operated for more than one user with shared access, usually available on a subscription basis. See related international definition of PDN.

Scientific Computer System - A computer system designed to process structured mathematics (such as Fast Fourier Transforms), and complex, highly redundant information (such as seismic data, sonar data, and radar), with large, on-line memories and very high-capacity output

SDLC - Synchronous Data Link Control—IBM's data link control for SNA. Supports a subset of HDLC modes.

SDN - Software-Defined Network

Security - Physical, electrical, and computer (digital) coding procedures to protect the contents of computer files and data transmission from inadvertent or unauthorized disclosure to meet the requirements of the Privacy Act and national classified information regulations

Service Delivery Point - The location of the physical interface between a network and customer/user equipment

Simplex - Unidirectional communications

Smart Box - A device for adapting existing DTE to new network standards such as OSI. Includes PADs and protocol converters, for example.

SNA - Systems Network Architecture—Seven-layer communications architecture designed by IBM. Layers correspond roughly but not exactly to OSI model.

Software - Computer programs

Supplies - Includes materials associated with the use of operations of computer systems, such as printer paper, keypunch card, disk packs, and tapes

Switched Circuit - Temporary connection between two network stations established through dial-up procedures

Synchronous - Communications operation with separate, continuous clocking at both sending and receiving stations

Systems Analyst - Individual who analyzes problems to be converted to a programmable form for application to computer systems

Systems House - Vendor that acquires, assembles, and integrates hardware and software into a total system to satisfy the data processing requirements of an end user. The vendor also may develop systems software products for license to end users. The systems house vendor does not manufacture mainframes.

Systems Integrator - Systems house vendor that develops systems interface electronics, applications software, and controllers for the CPU, peripherals, and ancillary subsystems which may have been provided by a contractor or the government (GFE). This vendor may either supervise or perform the installation and testing of the completed system.

T1 - Bell System designation for 1.544 mbps carrier capable of handling 24 PCM voice channels

TDM - Time Division Multiplexing—A multiplexing method that interleaves multiple transmissions on a single circuit by assigning a different time slot to each channel.

Token Passing - Local-area network protocol which allows a station to transmit only when it has the "token," an empty slot on the carrier

TOP - Technical Office Protocol —Protocol developed by Boeing Computer Services to support administrative and office operations as complementary functions to factory automation implemented under MAP

Turnkey System - System composed of hardware and software integrated into a total system designed to fulfill completely the processing requirements of a single application

Twisted-Pair Cable - Communications cabling consisting of pairs of single-strand metallic electrical conductors, such as copper wires, typically used in building telephone wiring and some LANs

Verification and Validation - Process for examining and testing applications and special systems software to verify that it operates on the target CPU and performs all of the functions specified by the user

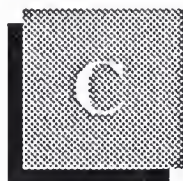
Voice-Grade - Circuit or signal in the 300-3300 Hz bandwidth typical of the public telephone system, nominally a 4 KHz user

VTAM - Virtual Telecommunications Access Method—Host-resident communications software for SNA networks

E

Other Considerations

When questions arise as to the proper place to count certain user expenditures, INPUT addresses the questions from the user viewpoint. Expenditures are then categorized according to the users' perception of the purchase.



Glossary of Acronyms

The federal government's procurement language uses a combination of acronyms, phrases, and words that is complicated by different agency definitions and interpretations. The government also uses terms of accounting, business, economics, engineering, and law with new applications and technology.

Acronyms and contract terms that INPUT encountered most often in program documentation and interviews for this report are listed below, but this glossary should not be considered all-inclusive. Federal procurement regulations (DAR, FPR, FAR, FIRMR, FPMR) and contract terms listed in RFIs, RFPs, and RFQs provide applicable terms and definitions.

Federal agency acronyms have been included if they are used in this report.

A

Federal Acronyms

AAS	Automatic Addressing System.
AATMS	Advanced Air Traffic Management System.
ACO	Administrative Contracting Offices (DCAS).
ACS	Advanced Communications Satellite (formerly NASA 30/20 GHz Satellite Program).
ACT-1	Advanced Computer Techniques (Air Force).
Ada	DoD High-Order Language.
ADA	Airborne Data Acquisition.
ADL	Authorized Data List.
ADS	Automatic Digital Switches (DCS).
AFA	Air Force Association.
AFCEA	Armed Forces Communications Electronics Association.
AGE	Aerospace Ground Equipment.
AIP	Array Information Processing.
AIS	Automated Information System.
AMPE	Automated Message Processing Equipment.

AMPS	Automated Message Processing System.
AMSL	Acquisition Management Systems List.
ANG	Army National Guard.
AP(P)	Advance Procurement Plan.
Appropriation	Congressionally approved funding for authorized programs and activities of the Executive Branch.
APR	Agency Procurement Request.
ARPANET	DARPA network of scientific computers.
ASP	Aggregated Switch Procurement.
ATLAS	Abbreviated Test Language for All Systems (for ATE-Automated Test Equipment).
Authorization	In the legislative process programs, staffing and other routine activities must be approved by Oversight Committees before the Appropriations Committee will approve the money from the budget.
AUSA	Association of the U.S. Army.
AUTODIN	AUTOMatic DIGital Network of the Defense Communications System.
AUTOSEVOCOM	AUTOMatic SECure VOice Communications Network
AUTOVON	AUTOMatic VOice Network of the Defense Communications System.
BA	Basic Agreement.
BAFO	Best And Final Offer.
Baselevel	Procurement, purchasing, and contracting at the military installation level.
BCA	Board of Contract Appeals.
Benchmark	Method of evaluating ability of a candidate computer system to meet user requirements.
Bid protest	Objection (in writing, before or after contract award) to some aspect of a solicitation by a valid bidder.
BML	Bidders Mailing List—Qualified vendor information filed annually with federal agencies to receive automatically RFPs and RFQs in areas of claimed competence.
BOA	Basic Ordering Agreement.
B&P	Bid and Proposal—Vendor activities in response to solicitation/specific overhead allowance.
BPA	Blanked Purchase Agreement.
Budget	Federal Budget, proposed by the President and subject to Congressional review.
C ²	Command and Control.
C ³	Command, Control, and Communications.
C ⁴	Command, Control, Communications, and Computers.
C ³ I	Command, Control, Communications, and Intelligence.
CAB	Contract Adjustment Board or Contract Appeals Board.
CADE	Computer-Aided Design and Engineering.

CADS	Computer-Assisted Display Systems.
CAIS	Computer-Assisted Instruction System.
CALS	Computer-Aided Automated Logistics System.
CAPS	Command Automation Procurement Systems.
CAS	Contract Administration Services or Cost Accounting Standards.
CASB	Cost Accounting Standards Board.
CASP	Computer-Assisted Search Planning.
CBD	<i>Commerce Business Daily</i> —U.S. Department of Commerce publication listing government contract opportunities and awards.
CBO	Congressional Budget Office.
CCEP	Commercial Comsec Endorsement Program.
CCDR	Contractor Cost Data Reporting.
CCN	Contract Change Notice.
CCPDS	Command Center Processing and Display Systems.
CCPO	Central Civilian Personnel Office.
CCTC	Command and Control Technical Center (JCS).
CDR	Critical Design Review.
CDRL	Contractor Data Requirement List.
CFE	Contractor-Furnished Equipment.
CFR	Code of Federal Regulations.
CICA	Competition in Contracting Act.
CIG	Computerized Interactive Graphics.
CIR	Cost Information Reports.
CM	Configuration Management.
CMI	Computer-Managed Instruction.
CNI	Communications, Navigation, and Identification.
CO	Contracting Office, Contract Offices, or Change Order.
COC	Certificate of Competency (administered by the Small Business Administration).
COCO	Contractor-Owned, Contractor-Operated.
CODSIA	Council of Defense and Space Industry Associations.
COMSTAT	Communications Satellite Corporation.
CONUS	CONTinental U. S.
COP	Capability Objective Package.
COTR	Contracting Officer's Technical Representative.
CP	Communications Processor.
CPAF	Cost-Plus-Award-Fee contract.
CPFF	Cost-Plus-Fixed-Fee contract.
CPIF	Cost-Plus-Incentive-Fee contract.
CPR	Cost Performance Reviews.
CPSR	Contractor Procurement System Review.
CR	Cost Reimbursement (Cost Plus contract).
CSA	Combat or Computer Systems Architecture.
C/SCSC	Cost/Schedule Control System Criteria (also called "C-Spec").
CWAS	Contractor Weighted Average Share in Cost Risk.

DAL	Data Accession List.
DAR	Defense Acquisition Regulations.
DARPA	Defense Advanced Research Projects Agency.
DAS	Data Acquisition System.
DBHS	Data Base Handling System.
DCA	Defense Communications Agency.
DCAA	Defense Contract Audit Agency.
DCAS	Defense Contract Administration Services.
DCASR	DCAS Region.
DCC	Digital Control Computer.
DCP	Development Concept Paper (DoD).
DCS	Defense Communications System.
DCTN	Defense Commercial Telecommunications Network.
DDA	Dynamic Demand Assessment (Delta Modulation).
DDC	Defense Documentation Center.
DDL	Digital Data Link—A segment of a communications network used for digital data transmission.
DDN	Defense Data Network.
DDS	Dynamic Diagnostics System.
DECCO	Defense Commercial Communications Office.
DECEO	Defense Communications Engineering Office.
D&F	Determination and Findings—Required documentation for approval of a negotiated procurement.
DIA	Defense Intelligence Agency.
DIF	Document Interchange Format—Navy-sponsored word processing standard.
DHHS	Department of Health and Human Services.
DIDS	Defense Integrated Data Systems
DISC	Defense Industrial Supply Center.
DLA	Defense Logistics Agency.
DMA	Defense Mapping Agency.
DNA	Defense Nuclear Agency.
DO	Delivery Order.
DOA	Department of Agriculture (also USDA).
DOC	Department of Commerce.
DOE	Department of Energy.
DOI	Department of Interior.
DOJ	Department of Justice.
DOS	Department of State.
DOT	Department of Transportation.
DPA	Delegation of Procurement Authority (granted by GSA under FPRs).
DPC	Defense Procurement Circular.
DQ	Definite Quantity Contract.
DQ/PL	Definite Quantity Price List Contract.
DR	Deficiency Report.
DSCS	Defense Satellite Communication System.
DSN	Defense Switched Network.
DSP	Defense Support Program (WWMCCS).
DSS	Defense Supply Service.

DTC	Design-To-Cost.
ECP	Engineering Change Proposal.
ED	Department of Education.
EEP	Equal Employment Opportunity.
EMC	Electro-Magnetic Compatibility.
EMCS	Energy Monitoring and Control System.
EO	Executive Order - Order issued by the President.
EOQ	Economic Ordering Quantity.
EPA	Economic Price Adjustment.
EPA	Environmental Protection Agency.
EPMR	Estimated Peak Monthly Requirement.
EPS	Emergency Procurement Service (GSA) or Emergency Power System.
EUC	End User Computing, especially in DoD.
FA	Formal Advertising.
FAC	FAcility Contract.
FAR	Federal Acquisition Regulations.
FCA	Functional Configuration Audit.
FCC	Federal Communications Commission.
FCDC	Federal Contract Data Center.
FCRC	Federal Contract Research Center.
FDPC	Federal Data Processing Center.
FEDSIM	Federal (Computer) SIMulation Center (GSA).
FEMA	Federal Emergency Management Agency.
FFP	Firm Fixed-Price contract (also Lump Sum Contract).
FIPS	NIST Federal Information Processing Standard.
FIPS PUBS	FIPS PUBlications.
FIRMR	Federal Information Resource Management Regulations.
FMS	Foreign Military Sales.
FOC	Final Operating Capability.
FOIA	Freedom of Information Act.
FP	Fixed-Price contract.
FP-L/H	Fixed-Price—Labor/Hour contract.
FP-LOE	Fixed-Price—Level-Of-Effort contract.
FPMR	Federal Property Management Regulations.
FPR	Federal Procurement Regulations.
FSC	Federal Supply Classification.
FSG	Federal Supply Group.
FSN	Federal Supply Number.
FSS	Federal Supply Schedule or Federal Supply Service (GSA).
FSTS	Federal Secure Telecommunications System.
FT Fund	A revolving fund, designated as the Federal Telecommunications Fund, used by GSA to pay for GSA-provided common-user services, specifically including the current FTS and proposed FTS 2000 services.

FTPS	Federal Telecommunications Standards Program administered by NCS; standards are published by GSA.
FTS	Federal Telecommunications System.
FY	Fiscal Year.
FYDP	Five Year Defense Plan.
GAO	General Accounting Office.
GFE	Government-Furnished Equipment.
GFM	Government-Furnished Material.
GFY	Government Fiscal Year.
GIDEP	Government-Industry Data Exchange Program
GOCO	Government-Owned, Contractor-Operated.
GOGO	Government-Owned, Government-Operated.
GOSIP	Government Open Systems Interconnection Profile.
GPO	Government Printing Office.
GPS	Global Positioning System.
GRH	Gramm-Rudman-Hollings Act (1985), also called Gramm-Rudman Deficit Control.
GS	General Schedule.
GSA	General Services Administration.
GSBCA	General Services Administration Board of Contract Appeal.
HCFA	Health Care Financing Administration.
HHS	(Department of) Health and Human Services.
HPA	Head of Procuring Activity.
HSDP	High-Speed Data Processors.
HUD	(Department of) Housing and Urban Development.
ICA	Independent Cost Analysis.
ICAM	Integrated, Computer-Aided Manufacturing.
ICE	Independent Cost Estimate.
ICP	Inventory Control Point.
ICST	Institute for Computer Sciences and Technology, National Institute of Standards and Technology.
IDAMS	Image Display And Manipulation System.
IDEP	Interservice Data Exchange Program.
IDN	Integrated Data Network.
IFB	Invitation For Bids.
IOC	Initial Operating Capability.
IOI	Internal Operating Instructions.
IPS	Integrated Procurement System.
IQ	Indefinite Quantity Contract.
IR&D	Independent Research & Development.
IRM	Information Resource Manager.
IXS	Information Exchange System.
JOCIT	JOvial Compiler Implementation Tool.
JSIPS	Joint Systems Integration Planning Staff.
JSOP	Joint Strategic Objectives Plan.

JSOR	Joint Service Operational Requirement.
JUMPS	Joint Uniform Military Pay System.
LC	Letter Contract.
LCC	Life Cycle Costing.
LCMP	Life Cycle Management Procedures (DD7920.1).
LCMS	Life Cycle Management System.
L-H	Labor-Hour Contract.
LOI	Letter of Interest.
LRPE	Long-Range Procurement Estimate.
LRIRP	Long-Range Information Resource Plan.
MAISRC	Major Automated Information Systems Review Council (DoD).
MANTECH	MANufacturing TECHnology.
MAPS	Multiple Address Processing System.
MAP/TOP	Manufacturing Automation Protocol/Technical and Office Protocol.
MASC	Multiple Award Schedule Contract.
MDA	Multiplexed Data Accumulator.
MENS	Mission Element Need Statement or Mission Essential Need Statement (see DD-5000.1 Major Systems Acquisition).
MILSCAP	MILitary Standard Contract Administration Procedures.
MIL SPEC	MILitary SPECification.
MIL STD	Military Standard.
MIPR	Military Interdepartmental Purchase Request.
MOD	Modification.
MOL	Maximum Ordering Limit (Federal Supply Service).
MPC	Military Procurement Code.
MYP	MultiYear Procurement.
NARDIC	Navy Research and Development Information Center.
NASA	National Aeronautics and Space Administration.
NCMA	National Contract Management Association.
NCS	National Communications System; responsible for setting U.S. Government standards administered by GSA; also holds primary responsibility for emergency communications planning.
NICRAD	Navy-Industry Cooperative Research and Development.
NIP	Notice of Intent to Purchase.
NIST	National Institute of Standards and Technology.
NMCS	National Military Command System.
NSA	National Security Agency.
NSEP	National Security and Emergency Preparedness.
NSF	National Science Foundation.
NSIA	National Security Industrial Association.

NTIA	National Telecommunications and Information Administration of the Department of Commerce; replaced the Office of Telecommunications Policy in 1970 as planner and coordinator for government communications programs; primarily responsible for radio.
NTIS	National Technical Information Service.
Obligation	Earmarking of specific funding for a contract from committed agency funds.
OCS	Office of Contract Settlement.
OFCC	Office of Federal Contract Compliance.
Off-site	Services to be provided near but not in government facilities.
OFMP	Office of Federal Management Policy (GSA).
OFPP	Office of Federal Procurement Policy.
OIRM	Office of Information Resources Management.
O&M	Operations & Maintenance.
OMB	Office of Management and Budget.
OM&R	Operations, Maintenance, and Readiness.
On-site	Services to be performed on a government installation or in a specified building.
OPM	Office of Procurement Management (GSA) or Office of Personnel Management.
Options	Sole-source additions to the base contract for services or goods to be exercised at the government's discretion.
OSHA	Occupational Safety and Health Act.
OSI	Open System Interconnect.
OSP	OffShore Procurement.
OTA	Office of Technology Assessment (Congress).
Out-Year	Proposed funding for fiscal years beyond the budget year (next fiscal year).
P-1	FY Defense Production Budget.
P3I	Pre-Planned Product Improvement (program in DoD).
PAR	Procurement Authorization Request or Procurement Action Report.
PAS	Pre-Award Survey.
PASS	Procurement Automated Source System.
PCO	Procurement Contracting Officer.
PDA	Principal Development Agency.
PDM	Program Decision Memorandum.
PDR	Preliminary Design Review.
PIR	Procurement Information Reporting.
PME	Performance Monitoring Equipment.
PMP	Purchase Management Plan.
PO	Purchase Order or Program Office.
POM	Program Objective Memorandum.
POSIX	Portable Open System Interconnect Exchange.

POTS	Purchase of Telephone Systems.
PPBS	Planning, Programming, Budgeting System.
PR	Purchase Request or Procurement Requisition.
PRA	Paperwork Reduction Act.
PS	Performance Specification - alternative to a Statement of Work, when work to be performed can be clearly specified.
QA	Quality Assurance.
QAO	Quality Assurance Office.
QMCS	Quality Monitoring and Control System (DoD software).
QMR	Qualitative Material Requirement (Army).
QPL	Qualified Products List.
QRC	Quick Reaction Capability.
QRI	Quick Reaction Inquiry.
R-1	FY Defense RDT&E Budget.
RAM	Reliability, Availability, and Maintainability.
RC	Requirements Contract.
R&D	Research and Development.
RDA	Research, Development, and Acquisition.
RDD	Required Delivery Date.
RD&E	Research, Development, and Engineering.
RDF	Rapid Deployment Force.
RDT&E	Research, Development, Test, and Engineering.
RFI	Request for Information.
RFP	Request for Proposal.
RFQ	Request for Quotation.
RFTP	Request for Technical Proposals (Two-Step).
ROC	Required Operational Capability.
ROI	Return on Investment.
RTAS	Real Time Analysis System.
RTDS	Real Time Display System.
SA	Supplemental Agreement.
SBA	Small Business Administration.
SB Set-Aside	Small Business Set-Aside contact opportunities with bidders limited to certified small businesses.
SCA	Service Contract Act (1964 as amended).
SCN	Specification Change Notice.
SDN	Secure Data Network.
SEC	Securities and Exchange Commission.
SE&I	Systems Engineering and Integration.
SETA	Systems Engineering/Technical Assistance.
SETS	Systems Engineering/Technical Support.
SIBAC	Simplified Intragovernmental Billing and Collection System.
SIMP	Systems Integration Master Plan.
SIOP	Single Integrated Operations Plan.
SNAP	Shipboard Nontactical ADP Program.

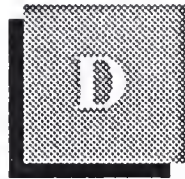
Sole Source Solicitation	Contract award without competition.
SOR	Invitation to submit a bid.
SOW	Specific Operational Requirement.
SSA	Statement Of Work.
SSAC	Source Selection Authority (DoD).
SSEB	Source Selection Advisory Council.
SSO	Source Selection Evaluation Board.
STINFO	Source Selection Official (NASA).
	Scientific and Technical INFOrmation Program—Air Force/NASA.
STU	Secure Telephone Unit.
SWO	Stop-Work Order.
Synopsis	Brief Description of contract opportunity in CBD after D & F and before release of solicitation.
TA/AS	Technical Assistance/Analysis Services.
TCP/IP	Transmission Control Protocol/Internet Protocol.
TEMPEST	Studies, inspections, and tests of unintentional electromagnetic radiation from computer, communication, command, and control equipment that may cause unauthorized disclosure of information; usually applied to DoD and security agency testing programs.
TILO	Technical and Industrial Liaison Office—Qualified Requirement Information Program—Army.
TM	Time and Materials contract.
TOA	Total Obligational Authority (Defense).
TOD	Technical Objective Document.
TR	Temporary Regulation (added to FPR, FAR).
TRACE	Total Risk Assessing Cost Estimate.
TRCO	Technical Representative of the Contracting Offices.
TREAS	Department of the Treasury.
TRP	Technical Resources Plan.
TSP	GSA's Teleprocessing Services Program.
TVA	Tennessee Valley Authority.
UCAS	Uniform Cost Accounting System.
USA	U.S. Army.
USAF	U.S. Air Force.
USCG	U.S. Coast Guard.
USMC	U.S. Marine Corps.
USN	U.S. Navy.
U.S.C.	United States Code.
USPS	United States Postal Service.
USRRB	United States Railroad Retirement Board.
VA	Department of Veterans Affairs.
VE	Value Engineering.
VHSIC	Very High Speed Integrated Circuits.
VIABLE	Vertical Installation Automation Base Line (Army).
VICI	Voice Input Code Identifier.

WBS	Work Breakdown Structure.
WGM	Weighted Guidelines Method.
WIN	WWMCCS Intercomputer Network.
WIS	WWMCCS Information Systems.
WITS	Washington Interagency Telecommunications System.
WS	Work Statement—Offerer's description of the work to be done (proposal or contract).
WWMCCS	World-Wide Military Command and Control System.
8(a)	Set-Aside Agency awards direct to Small Business Administration for direct placement with a socially/economically disadvantaged company.

B**General and Industry
Acronyms**

ADAPSO	Association of Data Processing Service Organization, now the Computer Software and Services Industry Association.
ADP	Automatic Data Processing.
ADPE	Automatic Data Processing Equipment.
ANSI	American National Standards Institute.
BOC	Bell Operating Company.
CAD	Computer-Aided Design.
CAM	Computer-Aided Manufacturing.
CBEMA	Computer and Business Equipment Manufacturers Association.
CCIA	Computers and Communications Industry Association.
CCITT	Comite Consultatif Internationale de Telegraphie et Telephonique; Committee of the International Telecommunication Union.
COBOL	COMmon Business-Oriented Language.
COS	Corporation for Open Systems.
CPU	Central Processing Unit.
DBMS	Data Base Management System.
DRAM	Dynamic Random Access Memory.
EIA	Electronic Industries Association.
EPROM	Erasable, Programmable, Read-Only Memory.
IEEE	Institute of Electrical and Electronics Engineers.
ISDN	Integrated Services Digital Networks.
ISO	International Organization for Standardization; voluntary international standards organization and member of CCITT.
ITU	International Telecommunication Union.

LSI	Large-Scale Integration.
MFJ	Modified Final Judgment.
PROM	Programmable, Read-Only Memory.
RBOC	Regional Bell Operating Company.
UNIX	AT&T Proprietary Operating System.
UPS	Uninterruptable Power Source.
VAR	Value-Added Reseller.
VLSI	Very Large Scale Integration.
WORM	Write-Once-Read-Many-Times.



Policies, Regulations, and Standards

A

OMB Circulars	A-11	Preparation and Submission of Budget Estimates.
	A-49	Use of Management and Operating Contracts.
	A-71	Responsibilities for the Administration and Management of Automatic Data Processing Activities.
	A-109	Major Systems Acquisitions.
	A-120	Guidelines for the Use of Consulting Services.
	A-121	Cost Accounting, Cost Recovery, and Integrated Sharing of Data Processing Facilities.
	A-123	Internal Control Systems.
	A-127	Financial Management Systems.
	A-130	Management of Federal Information Resources.
	A-131	Value Engineering.

B

GSA Publications	The FIRMR as published by GSA is the primary regulation for use by federal agencies in the management, acquisition, and use of both ADP and telecommunications information resources.	
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C

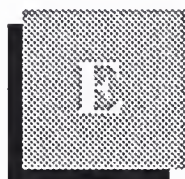
DoD Directives	DD-5000.1	Major System Acquisitions.
	DD-5000.2	Major System Acquisition Process.
	DD-5000.11	DoD Data Elements and Data Codes Standardization Program.
	DD-5000.31	Interim List of DoD-Approved, High-Order Languages.
	DD-5000.35	Defense Acquisition Regulatory Systems.
	DD-5200.1	DoD Information Security Program.
	DD-5200.28	Security Requirements for Automatic Data Processing (ADP) Systems.

DD-5200.28-M	Manual of Techniques and Procedures for Implementing, Deactivating, Testing, and Evaluating Secure Resource Sharing ADP Systems.
DD-7920.2	Major Automated Information Systems Approval Process.
DD-7935	Automated Data Systems (ADS) Documentation.

D**Standards**

ADCCP	Advanced Data Communications Control Procedures; ANSI Standard X3.66 of 1979; also NIST FIPS 71.
CCITT G.711 CCITT T.0	International PCM standard. International standard for classification of facsimile apparatus for document transmission over telephone-type circuits.
DEA-1	Proposed ISO standard for data encryption based on the NIST DES.
EIA RS-170	Monochrome video standard.
EIA RS-170A	Color video standard.
EIA RS-464	EIA PBX standards.
EIA RS-465	Standard for Group III facsimile.
EIA RS-466	Facsimile standard; procedures for document transmission in the General Switched Telephone Network.
EIA RS-232-C	EIA DCE to DTE interface standard using a 25-Pin connector; similar to CCITT V-24.
EIA RS-449	New EIA standard DTE to DCE interface which replaces RS-232-C.
FED-STD 1000	Proposed Federal Standard for adoption of the full OSI reference model.
FED-STD 1026	Federal Data Encryption Standard (DES) adopted in 1983; also FIPS 46.
FED-STD 1041	Equivalent to FIPS 100.
FED-STD 1061	Group II Facsimile Standard (1981).
FED-STD 1062	Federal standard for Group III facsimile; equivalent to EIA RS-465.
FED-STD 1063	Federal facsimile standard; equivalent to EIA RS-466.
FED-STDs 1005, 1005A-1008	Federal Standards for DCE Coding and Modulation.
FIPS 46	NIST Data Encryption Standard (DES).
FIPS 81	DES Modes of Operation.

FIPS 100	NIST Standard for packet-switched networks; subset of 1980 CCITT X.25.
FIPS 107	NIST Standard for local area networks, similar to IEEE 802.2 and 802.3.
FIPS 146	Government Open Systems Interconnection (OSI) Profile (GOSIP).
FIPS 151	NIST POSIX (Portable Operating System Interface for UNIX) standard.
IEEE 802.2	OSI-Compatible IEEE standard for data-link control in local area networks.
IEEE 802.3	Local area network standard similar to Ethernet.
IEEE 802.4	OSI-compatible standard for token-bus local area networks.
IEEE 802.5	Local area networks standard for token-ring networks.
IEEE P1003.1	POSIX standard, similar to FIPS 151.
MIL-STD-188-114C	Physical interface protocol similar to RS-232 and RS-449.
MIL-STD-1777	IP-Internet Protocol.
MIL-STD-1778	TCP - Transmission Control Protocol.
MIL-STD-1780	File Transfer Protocol.
MIL-STD-1781	Simple Mail Transfer Protocol (electronic mail).
MIL-STD-1782	TELNET - virtual terminal protocol.
MIL-STD-1815A	Ada Programming Language Standard.
SVID	UNIX System Interface Definition.
X12	ANSI standard for Electronic Data Interchange
X.21	CCITT Standard for interface between DTE and DCE for synchronous operation on public data networks.
X.25	CCITT standard for interface between DTE and DCE for terminals operating in the packet mode on public data networks.
X.75	CCITT standard for links that interface different packet networks.
X.400	ISO Application-level standard for the Electronic transfer of messages (electronic mail).



Related INPUT Reports

A

Annual Market Analyses

U.S. Information Services Vertical Markets

U.S. Information Services Cross-Industry Markets

Procurement Analysis Reports, GFY 1991-GFY 1996

B

Industry Surveys

U.S. Information Services Industry

Directory of Leading U.S. Information Services Vendors

C

Market Reports

Federal Microcomputer Market, 1989-1994

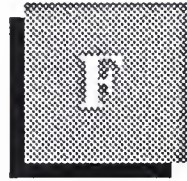
Defense Logistics Agency Information Services Market

Federal Computer Security Market

Federal Professional Services Market

Federal Processing Services and Operational Support Markets

Federal Software Products and Related Services Market



Questionnaires

A

Definitions

For this survey, we have defined Systems Integration as the following vendor-supplied products and services:

- Equipment
 - Information Systems
 - Communications
- Software Products
 - Systems Software
 - Applications Software
- Professional Services (during Contract)
 - Consulting
 - Feasibility and Trade-off Studies
 - Selection of Hardware, Networks, and Software
 - Project Management
- Design/Integration
 - Systems Design
 - Installation of Hardware, Networks, and Software
 - Demonstration of Testing
- Software Development
 - Modification of Software Packages
 - Modification of Existing Software
 - Custom Development of Software
- Education/Training and Documentation
- Operation and Maintenance (during Contract)
 - Equipment/Network Maintenance

- Software Maintenance
- Education and Training
- Network Management
- Systems Operations (during Contract)
 - Replaces Facilities Management
 - 'Ownership' with Customer
 - Not-Shared Operations
 - Transient Possibility
- Other Products/Services
 - Data Processing Supplies
 - Processing/Network Services
 - Data/Voice Communication Services
 - Engineering Services
 - Other

B**Questionnaires****1. Federal Systems Integration Market****Industry Questionnaire**

1. Does your company now provide, or plan to provide systems integration services to the federal government? **(check one)**

Yes ☐
 No ☐ **(end)**

- 2a. What types of systems integration services does your company currently provide, and plan to provide to the federal market through FY 1995? **(check all that apply—refer to definition page)**

	<u>Current</u>	<u>Planned</u>
Software Development	<input type="checkbox"/>	<input type="checkbox"/>
Equipment	<input type="checkbox"/>	<input type="checkbox"/>
Software Products	<input type="checkbox"/>	<input type="checkbox"/>
Design/Integration	<input type="checkbox"/>	<input type="checkbox"/>
Professional Services	<input type="checkbox"/>	<input type="checkbox"/>
Education/Training and Documentation	<input type="checkbox"/>	<input type="checkbox"/>
Operation and Maintenance	<input type="checkbox"/>	<input type="checkbox"/>
Systems Operations	<input type="checkbox"/>	<input type="checkbox"/>
Other Products/Services	<input type="checkbox"/>	<input type="checkbox"/>

- 2b. As a system integrator, what functions does your company normally subcontract to other vendors? **(please be specific)**
-

3. Approximately what percent of your company's federal systems integration business for FY 1989 was in each of the following categories? **(remember your responses should add to 100%)**

<u>SI Category</u>	<u>Indicate Percent</u>
Software Development	_____ %
Equipment	_____ %
Software Products	_____ %

<u>SI Category</u>	<u>Indicate Percent</u>
Design/Integration	_____ %
Professional Services	_____ %
Education/Training and Documentation	_____ %
Operation and Maintenance	_____ %
Systems Operations	_____ %
Other Products/Services	_____ %

4. Which of the following reasons have influenced your company's decision to compete in the federal systems integration market for products or services? (check all that apply)

Growth Potential	<input type="checkbox"/>
Past Systems Integration Success	<input type="checkbox"/>
New Technology	<input type="checkbox"/>
Profit Potential	<input type="checkbox"/>
Software Skill	<input type="checkbox"/>
Possess Diversity of Required Skills	<input type="checkbox"/>
Long-Term Involvement	<input type="checkbox"/>
Other (specify): _____	<input type="checkbox"/>

5. Which range best describes your company's total 1989 revenues (all divisions, all markets)? (check one only)

Less than \$100 million

\$1 million - \$25 million	<input type="checkbox"/>
\$26 million - \$50 million	<input type="checkbox"/>
\$51 million - \$75 million	<input type="checkbox"/>
\$76 million - \$100 million	<input type="checkbox"/>

Greater than \$100 million

\$101 million - \$250 million	<input type="checkbox"/>
\$251 million - \$500 million	<input type="checkbox"/>
\$501 million - \$1 billion	<input type="checkbox"/>
Greater than \$1 billion	<input type="checkbox"/>

- 6a. Approximately how many employees are in your entire company? (enter number) _____
- 6b. How many employees are in your company's federal market division (enter number) _____
- 7a. In your opinion, do you believe the commercial systems integration market will increase, decrease, or remain the same through FY 1995? (check one)

Increase	<input type="checkbox"/> by what percent? _____ %
Decrease	<input type="checkbox"/> by what percent? _____ %
Remain the same	<input type="checkbox"/>

7b. Why?

8. Indicate which range best describes your company's 1989 revenues from each segment of the federal systems integration market listed below? (for each category check one revenue range)

Market Segment Category

	Soft- ware Devel- opment	Equip- ment	Soft- ware	Design/ Integra- Prod- ucts	Prof. Svc. tion	Ed./ Trai- ning/ Doc.	Ops. & Mnt. Svc.	Systems Opera- tions	Other Prod- ucts/
Revenue Range									
LESS THAN \$100 MILLION									
\$ 1 million - \$ 25 million	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
\$ 26 million - \$ 50 million	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
\$ 51 million - \$ 75 million	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
\$ 76 million - \$100 million	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
GREATER THAN \$100 MILLION									
\$101 million - \$250 million	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
\$251 million - \$500 million	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
\$501 million - \$ 1 billion	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Greater than \$1 billion	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

- 9a. Does your company forecast that its federal systems integration revenues will increase, decrease or remain the same through FY 1995? (check one)

Increase ☐ by what percent? _____%

Decrease ☐ by what percent? _____%

Remain the same ☐

9b. Why?

10. Which procurement approaches will your company pursue in the federal systems integration market? (check all that apply)

- Sole-source seed jobs ☐
- Competitive niche jobs ☐
- IQID Requirements Contracts ☐
- Basic Ordering Agreements ☐
- Major SI opportunities ☐
- Other (specify): _____ ☐

- 11a. Indicate below how your company views systems integration opportunities by agency type: (check one for each agency)

Agency Type	Opportunities		
	Increasing	Decreasing	Remaining the Same
DoD	_____	_____	_____
Civil	_____	_____	_____

- 11b. Please name the specific agencies that provide the most attractive systems integration opportunities for your company.

12. In your opinion, what differences exist between the federal and commercial systems integration markets?

13. How important do you believe each of the following factors should be in controlling vendor selection for systems integration contracts by federal agencies? Use a 1-5 scale to rate each factor; 5 = of crucial importance, and 1 = of no importance at all. (read each factor, circle one response)

Factor	Rating				
	1	2	3	4	5
Technical Solution	1	2	3	4	5
Contract Type	1	2	3	4	5
Risk Containment Procedures	1	2	3	4	5
Initial Cost	1	2	3	4	5
Life Cycle	1	2	3	4	5
Other (specify): _____	1	2	3	4	5

14. Does your company perceive that any of the following factors will impact the federal systems integration market positively or negatively and why?

IMPACT
(check one)

	<u>Positive</u>	<u>Negative</u>	
a. Budget Constraints? How/why? _____ _____ _____	<input type="checkbox"/>	<input type="checkbox"/>	
b. Democratic Administration? How/why? _____ _____ _____	<input type="checkbox"/>	<input type="checkbox"/>	
c. Republican Administration? How/why? _____ _____ _____	<input type="checkbox"/>	<input type="checkbox"/>	
d. New Technology? How/why? _____ _____ _____	<input type="checkbox"/>	<input type="checkbox"/>	

DEADLINE FOR COMPLETED QUESTIONNAIRES IS _____

2. Federal Systems Integration Case Study

Prime Contractor Questionnaire

Program Name: _____

Department: _____

Branch/Office: _____

Agency: _____

Address: _____

Agency/Project Manager: _____

Prime Contractor Name: _____

Address: _____

Contractor Interviewee: _____

Title: _____

Phone: _____

1. Please describe the mission problem/function that this systems integration contract was to solve/fulfill? (Example: Agency was running a manual inventory system to ship 2.5M parts per year. The depot center was approximately 60,000 square feet. The agency forecasted growth in this requirement and automation was the only way to keep up with demand.)

(specify mission): _____

2. What major tasks did your company perform as a systems integrator that were critical to the program's success? Please be specific. (Example: Designed a new depot center; designed and implemented a new computer system; designed and implemented a monorail system to transport parts within the depot; altered existing depot center to accommodate planned depot.)

(specify tasks performed): _____

3. Please specify the following summary contract and schedule information:

- a. Contract type: _____
 b. Contract value: \$ _____
 c. Contract duration: _____
 d. RFP release date: _____
 e. Bid due date: _____
 f. Contract award date: _____
 g. Project completion date: _____

4. For this systems integration contract, provide the names of the subcontractors and functions they were responsible for:

<u>Contractor</u>	<u>Company</u>	<u>Function</u>
Subcontractor	_____	_____
Subcontractor	_____	_____
Subcontractor	_____	_____
Outside Consultant	_____	_____

For Questions 5 through 11, please describe the following project components of this systems integration contract in each category where applicable:

Equipment

(Check One)
 Agency Contractor
Supplied Supplied

- 5a. Equipment: (specify hardware make(s), model number(s), quantity)

_____	<input type="checkbox"/>	<input type="checkbox"/>
_____	<input type="checkbox"/>	<input type="checkbox"/>
_____	<input type="checkbox"/>	<input type="checkbox"/>

- 5b. Enter total \$ value of IT equipment: \$ _____

Software

6a. Specify systems software type(s): _____

6b. Specify application software type(s): _____

6c. Enter total \$ value of applications software: \$ _____

Professional Services

7a. Estimate the total value of the professional services portion of this contract:

\$ _____

7b. For each professional service listed, indicate contractor responsibility. (circle: P for Prime Contractor; S for Subcontractor; O for Other)

Circle One

Consulting Services	P	S	O
Design/Integration	P	S	O
Project Management	P	S	O
Education/Training	P	S	O

Applications

8. Specify which applications were developed or modified for this project and by which contractor(s) for each software category.

a. Off-the-shelf: _____

b. Custom developed: _____

Operations and Maintenance

9a. Estimate the total value of the operations and maintenance portion of this contract:

\$ _____ (enter value)

9b. Circle which contractor had responsibility for operations and maintenance: (circle: P for Prime Contractor; S for Subcontractor; O for Other)

(circle one) P S O

Other Products and Information Services

10a. What was the \$ value of other ADP products and information services in this contract?

\$ _____ (enter value)

10b. Specify products and information services:

Other Noninformation Services

11a. What was the \$ value of other noninformation services in this contract? \$ _____
(enter value)

11b. Specify noninformation services:

12. How would you rate your company's overall success in satisfying the user requirements of this systems integration contract so far? (use a 1-5 scale: where 5 = extremely successful and 1 = not successful at all)

(circle one) 1 2 3 4 5

Additional comments: _____

13. What funding was originally appropriated for this contract?

(specify amount) \$ _____

14a. Did the scope of this project change from the contract award date? (check one)

Yes ☐

No ☐

14b. If Yes, how was this issue resolved with the federal agency?

Please explain: _____

15. Please detail the current status of this systems integration contract:

PLEASE RETURN THIS QUESTIONNAIRE BY _____

3. Federal Systems Integration Case Study

Agency Questionnaire

Program Name: _____

Department: _____

Branch/Office: _____

Agency: _____

Address: _____

Program/Project Manager: _____

Phone: _____

Interviewee/Title: _____

1. Please describe the mission problem/function that this systems integration contract was to solve/fulfill? (**Example:** Agency was running a manual inventory system to ship 2.5M parts per year. The depot center was approximately 60,000 square feet. The agency forecasted growth in this requirement and automation was the only way to keep up with demand.)

(specify mission): _____

2. What major tasks did your vendor perform as a systems integrator that were critical to the program's success? Please be specific. (**Example:** Designed a new depot center; designed and implemented a new computer system; designed and implemented a monorail system to transport parts within the depot; altered existing depot center to accommodate planned depot.)

(specify tasks performed): _____

3. Please specify the following summary contract and schedule information:

- a. Contract Type: _____
- b. Contract Value: \$ _____
- c. Contract Duration: _____
- d. RFP release date: _____
- e. Bid due date: _____
- f. Contract award date: _____
- g. Project completion date: _____

4. For this systems integration contract, provide the names of the contractors and functions they were responsible for:

Contractor	Company	Function
Prime Contractor	_____	_____
Subcontractor	_____	_____
Subcontractor	_____	_____
Outside Consultant	_____	_____

For Questions 5 through 11, please describe the following project components of this systems integration contract in each category where applicable:

Equipment

Check One
 Agency Contractor
Supplied Supplied

5a. Equipment: (specify hardware make(s), model number(s), quantity)

_____	_____	_____
_____	_____	_____
_____	_____	_____

5b. Enter total \$ value of IT equipment: \$ _____

Software

6a. Specify systems software type(s): _____

6b. Specify applications software type(s): _____

6c. Enter total \$ value of applications software: \$ _____

Professional Services

7a. Estimate the total value of the professional services portion of this contract:

\$ _____

7b. For each professional service listed, indicate contractor responsibility. (circle: P for Prime Contractor; S for Subcontractor; O for Other)

Circle One

Consulting Services	P	S	O
Design/Integration	P	S	O
Project Management	P	S	O
Education/Training	P	S	O

Applications

8. Specify which applications were developed or modified for this project and by which contractor(s) for each software category.

a. Off-the-shelf: _____

b. Custom developed: _____

Operations and Maintenance

9a. Estimate the total value of the operations and maintenance portion of this contract:

\$ _____ (enter value)

9b. Circle which contractor had responsibility for operations and maintenance: (circle: P for Prime Contractor; S for Subcontractor; O for Other)

(circle one) P S O

Other Products and Information Services

10a. What was the \$ value of other ADP products and information services in this contract?

\$ _____ (enter value)

10b. Specify products and information services:

Other Noninformation Services

11a. What was the \$ value of other noninformation services in this contract?

\$ _____ (enter value)

11b. Specify noninformation services:

12. How would you rate your agency's overall satisfaction with the results of this systems integration contract? (use a 1-5 scale: 5 = extremely satisfied; and 1 = not satisfied at all)

(circle one) 1 2 3 4 5

Additional comments: _____

13. What funding was originally appropriated for this contract? (specify amount)

\$ _____

14a. Did the scope of this project change from the contract award date? (check one)

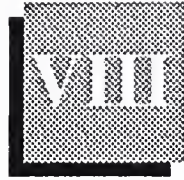
Yes ☐

No ☐

14b. If Yes, how was this issue resolved with the contractor? Please explain:

15. Please detail the current status of this sytems integration contract:

PLEASE RETURN THIS QUESTIONNAIRE BY _____



About INPUT

INPUT LIBRARY

Company Profile

INPUT provides planning information, analysis, and recommendations to managers and executives in the information services industries. Through market research, technology forecasting, and competitive analysis, INPUT supports client management in making informed decisions.

Continuous-information advisory services, proprietary research/consulting, merger/acquisition assistance, and multiclient studies are provided to users and vendors of information systems and services (software products, processing and network services, systems management, and systems/software maintenance and support).

Many of INPUT's professional staff have more than 20 years' experience in their areas of specialization. Most have held management positions in large organizations, enabling them to supply practical solutions to complex business problems.

Formed as a privately held corporation in 1974, INPUT has become a leading international research and consulting firm. Clients include more than 100 of the world's largest and most technically advanced companies.

Staff Credentials

INPUT's staff have been selected for their broad background in a variety of functions, including planning, marketing, operations, and information processing. Many of INPUT's professional staff have held executive positions in some of the world's leading organizations, both as vendors and users of information services, in areas such as the following:

- Processing Services
- Professional Services
- Turnkey Systems
- Applications Software
- Field (customer) Service
- Banking and Finance
- Insurance
- Process Manufacturing
- Telecommunications
- Federal Government

Educational backgrounds include both technical and business specializations, and many INPUT staff hold advanced degrees.

U.S. and European Advisory Services

INPUT offers the following advisory services on an annual subscription basis.

1. Market Analysis Program—U.S.

The Market Analysis Program provides up-to-date U.S. information services market analyses, five-year forecasts, trend analyses, vertical/cross-industry market reports, an on-site presentation, hotline inquiry service, and sound recommendations for action. It covers software products, turnkey systems, processing and network services, and professional services markets. It is designed to satisfy the planning and marketing requirements of current and potential information services vendors.

2. Market Analysis Program—Europe

This program is designed to help vendors of software and services with their market planning. It examines the issues in the marketplace, from both a user and a vendor viewpoint. It provides detailed five-year market forecasts to help plan for future growth.

3. Vendor Analysis Program—U.S.

A comprehensive reference service covering more than 400 U.S. information services vendor organizations, VAP is often used for competitive analysis and prescreening of acquisition and joint-venture candidates. Profiles on leading vendors are updated regularly, and hotline inquiry service is provided.

4. Vendor Analysis Program—Europe

This is an invaluable service for gaining competitive information. Two binders are provided—one is a directory listing names, addresses, and turnover of some 700 European software and services vendors. The second binder contains profiles of about 300 key vendors.

5. Electronic Data Interchange Program

Focusing on what is fast becoming a major computer/communications market opportunity, this program keeps you well informed. Through monthly newsletters, timely news flashes, comprehensive studies, and telephone inquiry privileges, you will be informed and stay informed about the events and issues impacting this burgeoning market.

6. Network Services Program—Europe

Network services is a fast-growing area of the software and services industry. This program is essential to vendors of EDI, electronic information services, and network products and services. It keeps clients informed of the latest developments and includes a monthly newsletter on EDI.

7. Systems Integration Program—U.S.

Focus is on the fast-moving world of systems integration and the provision of complex information systems requiring vendor management and installation of multiple products and services. The program includes an annual market analysis of the U.S. systems integration market, SI vendor profiles and updates, topical market analysis reports, and an annual SI seminar.

8. Systems Operations Program—U.S.

This program focuses on the exciting resurgence of the market for outsourcing systems operations. It includes an annual market analysis report of the systems operations market, SO vendor profiles and updates, topical market analysis reports, and an annual SO seminar.

9. Systems Management Program—Europe

Systems integration and systems operations (facilities management) are key growth areas for the decade. This program examines these two areas and analyzes current market trends, user needs, and vendor offerings.

10. Federal Information Systems and Services Program

This program presents highly specific information on U.S. federal government procurement practices, identifies information services vendor opportunities, and provides guidance from INPUT's experienced Washington professionals to help clients maximize sales effectiveness in the federal government marketplace.

11. State Information Systems and Services Program (proposed)

This program presents extensive information on state government spending, procurement policies, identifies key contacts, opportunities, and provides guidance from INPUT's experienced professionals to help clients maximize sales opportunities in the state government marketplace.

12. Information Systems Program

ISP is designed for executives of large information systems organizations and provides crucial information for planning, procurement, and management decision making. This program is widely used by both user and vendor organizations.

13. Customer Service Program—International

This program provides customer service organization management with data and analyses needed for marketing, technical, financial, and organizational planning. The program pinpoints user perceptions of service received, presents vendor-by-vendor service comparisons, and analyzes and forecasts service markets for large systems, minicomputers, personal computer systems, and third-party maintenance. A monthly newsletter helps clients keep informed of the latest developments in the market.

14. Customer Service Program—Europe

Customer service is an expanding area. Companies are now expanding from hardware service to more software-related maintenance and professional services. This program helps vendors penetrate these new areas and provides guidelines for future market strategy. A monthly newsletter helps clients keep abreast of the latest developments in the market.

15. Worldwide Information Services Market Forecasts

In 1989 INPUT initiated this research study, which provides an international forecast for the information services market.

Customized Advisory Services

In addition to standard continuous-information programs, INPUT will work with you to develop and provide a customized advisory service that meets your unique requirements.

Acquisition Services

INPUT also offers acquisition services that are tailor-made for your requirements. INPUT's years of experience and data base of company information about information systems and services companies have helped many companies in their acquisition processes.

An Effective Combination

INPUT'S Executive Advisory Services are built on an effective combination of research-based studies, client meetings, informative conferences, and continuous client support. Each service is designed to deliver the information you need in the form most useful to you, the client. Executive Advisory Services are composed of *varied combinations of the following products and services*:

Research-Based Studies

Following a proven research methodology, INPUT conducts major research studies throughout each program year. Each year INPUT selects issues of concern to management. Topical reports are prepared and delivered throughout the calendar year.

Information Service Industry Reports

INPUT's Executive Advisory Services address specific issues, competitive environments, and user expenditures relative to:

Software Products
Processing Services
Network Services
Systems Integration
Systems Operations

Professional Services
Turnkey Systems
Small-Systems Service
Third-Party Maintenance
Large-Systems Service

Industry-Specific Market Reports

Detailed analyses of market trends, forces driving the markets, problems, opportunities, and user expenditures are available for the following sectors:

Discrete Manufacturing	Insurance
Process Manufacturing	Medical
Transportation	Education
Utilities	Business Services
Telecommunications	Consumer Services
Retail Distribution	Federal Government
Wholesale Distribution	State and Local Government
Banking and Finance	Miscellaneous Industries

Cross-Industry Market Report

A separate analysis covers the following cross-industry application areas:

Accounting	Office Systems
Education and Training	Planning and Analysis
Engineering and Scientific	Other Cross-Industry Sectors
Human Resources	

Hotline: Client Inquiry Services

Inquiries are answered quickly and completely through use of INPUT's Client Hotline. Clients may call any INPUT office (San Francisco, New York, Washington D.C., London, or Paris) during business hours or they may call a voicemail service to place questions after hours. This effective Hotline service is the cornerstone of every INPUT Executive Advisory Service.

The Information Center

One of the largest and most complete collections of information services industry data, the Information Center houses literally thousands of up-to-date files on vendors, industry markets, applications, current/emerging technologies, and more. Clients have complete access to the Information Center. In addition to the information contained in its files, the center maintains an 18-month inventory of over 130 major trade publications, vendor consultant manuals, economic data, government publications, and a variety of important industry documents.

Access to INPUT Professional Staff

Direct access to INPUT's staff, many of whom have more than 20 years of experience in the information industry, provides you with continuous research and planning support. When you buy INPUT, you buy experience and knowledge.

Client Conference

You can attend INPUT's Client Conference. This event addresses the status and future of the information services industry, the competitive environment, important industry trends potentially affecting your business, the impact of new technology and new service offerings, and more.

You will attend with top executives from many of the industry's leading, fastest-growing, and most successful vendor companies—and with top Information Systems (IS) managers from some of the world's most sophisticated user organizations.

On-Site Presentation by INPUT Executives

Many of INPUT's programs offer an informative presentation at your site. Covering the year's research, this session is scheduled at the convenience of the client.

Proprietary Research Service

INPUT conducts proprietary research that meets the unique requirements of an individual client. INPUT's custom research is effectively used:

For Business Planning

Planning for new products, planning for business startups, planning for expansion of an existing business or product line—each plan requires reliable information and analysis to support major decisions. INPUT's dedicated efforts and custom research expertise in business planning ensure comprehensive identification and analysis of the many factors affecting the final decision.

For Acquisition Planning

Successful acquisition and divestiture of information services companies requires reliable information. Through constant contact with information services vendor organizations and continuous tracking of company size, growth, financials, and management "chemistry," INPUT can provide the valuable insight and analysis you need to select the most suitable candidates.

For the Total Acquisition Process

INPUT has the credentials, the data base of company information, and—most importantly—the contacts to assist you with total acquisition and/or partnering relationship processes:

- Due Diligence
- Schedules and Introduction
- Criteria & Definitions
- Retainer and Fee-Based
- Active Search

For Competitive Analysis

Knowing marketing and sales tactics, product capabilities, strategic objectives, competitive postures, and strengths and weaknesses of your competition is as critical as knowing your own. The career experience of INPUT's professionals—coupled with INPUT's collection and maintenance of current financial, strategic, tactical, and operational information about more than 400 active companies—uniquely qualifies INPUT to provide the best competitive information available today.

For Market and Product Analysis

Developing new products and entering new markets involves considerable investment and risk. INPUT regularly conducts research for clients to identify product requirements, market dynamics, and market growth.

More About INPUT...

- More than 5,000 organizations, worldwide, have charted business directions based on INPUT's research and analysis.
- Many clients invest more than \$50,000 each year to receive INPUT's recommendations and planning information.
- INPUT regularly conducts proprietary research for some of the largest companies in the world.
- INPUT has developed and maintains one of the most complete information industry libraries in the world (access is granted to all INPUT clients).
- INPUT clients control an estimated 70% of the total information industry market.
- INPUT analyses and forecasts are founded upon years of practical experience, knowledge of historical industry performance, continuous tracking of day-to-day industry events, knowledge of user and vendor plans, and business savvy.
- INPUT analysts accurately predicted the growth of the information services market—at a time when most research organizations deemed it a transient market. INPUT predicted the growth of the microcomputer market in 1980 and accurately forecasted its slowdown in 1984.

For More Information . . .

INPUT offers products and services that can improve productivity, and ultimately profit, in your firm. Please give us a call today. Our representatives will be happy to send you further information on INPUT services or to arrange a formal presentation at your offices.

For details on delivery schedules, client service entitlement, or Hotline support, simply call your nearest INPUT office. Our customer support group will be available to answer your questions.

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